

1 INTERNET-DRAFT

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6 Job Submission Protocol Mapping Recommendations  
7 for the Job Monitoring MIB

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33  
34 Abstract

35  
36 This Internet-Draft defines the recommended mapping for many  
37 currently popular Job submission protocols to objects and  
38 attributes the Job Monitoring MIB.  
39

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46  
 47  
 48 1.0 INTRODUCTION  
 49  
 50 The Job Monitoring MIB [JobMIB] is intended to be implemented in a  
 51 device or server that supports any job submission protocol. However,

1 the information available and the method of presentation varies  
2 significantly by job submission protocol. A common method of mapping  
3 job submission information to the Job Monitoring MIB is essential for  
4 interoperability of Job MIB agents and monitoring applications. This  
5 document defines recommended mappings for most popular job submission  
6 protocols to insure this compatibility.

7  
8 All mappings are unidirectional from the job submission protocol to the  
9 MIB. It is assumed that support of the job submission protocol in the  
10 printer implies that the reverse information flow is presently defined  
11 and does not require interaction from the MIB. This mapping is not  
12 defined in this document as it should be obvious.

13  
14 This document refers to system configurations that are defined in the  
15 Job Monitoring MIB [JobMIB]. For those readers that are familiar with  
16 the configuration descriptions, a short summary appears here. Please  
17 see the Job MIB document for further details.

18  
19 Configuration 1: This is a simple peer-to-peer system which contains  
20 only a client and a printer. The Job MIB agent is resident in  
21 the printer.

22  
23 Configuration 2: This system contains a client, server, and a  
24 printer. The Job MIB agent is resident in the server.

25  
26 Configuration 3: This system, as in configuration 2, contains a  
27 client, server, and a printer. In this case the Job MIB agent is  
28 implemented within the printer.

29  
30 The most important object to be mapped is jmJobSubmissionId, since this  
31 is the key for the user or client to locate a submitted job. Therefore,  
32 jmJobSubmissionId is specified for all job submission protocols defined  
33 in this document. The remaining objects mapped include only those items  
34 that have the equivalent information presented to the printer by the job  
35 submission protocol.

## 36 37 38 2.0 LINE PRINTER DAEMON (LPR/LPD) PROTOCOL

39  
40 The LPR/LPD printing protocol [LPD] is used with BSD Unix systems in the  
41 client-server-printer configuration. Usage of the Job Monitoring MIB  
42 with LPR/LPD will most likely conform to Configuration 3, where the  
43 monitor application or the server uses SNMP to obtain job information  
44 from the printer. The client communicates with the Unix server using  
45 the existing LPD protocol to obtain job information.

46  
47 The LPR/LPD protocol is also used in the Windows environment to  
48 implement peer-to-peer printing, as shown in configuration 1. In this  
49 case, SNMP is used by the client and/or the monitor application to  
50 obtain the job information.

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

6  
7 The LPR/LPD protocol transfers print job data and control information in  
8 separate files, known as the Data File and Control File, respectively.  
9 Most of the information concerning the print job is contained in the  
10 Control File. In many LPD implementations, the Control File is  
11 transferred following the Data File. Thus much of the information  
12 concerning the job may not be available until the completion of the data  
13 transmission.

#### 16 2.1 jmJobSubmissionId Mapped to LPR/LPD

17  
18 The LPR/LPD Receive Data File command contains a parameter which defines  
19 the name of the data file. This name field is structured as follows:

20  
21 dfaXXX<host-name> or daXXXX<host-name>

22  
23 Where XXX or XXXX is the numeric job number assigned by the LPR/LPD  
24 client submitting the print job. The recommended mapping of this name  
25 field to jmJobSubmissionId is:

26  
27 octet 1: '9'

28  
29 octets 2-40: Contains the <host-name> portion of the name field. If  
30 the <host-name> portion is less than 40 octets, the  
31 left-most character in the string shall appear in octet  
32 position 2. Any unused portion of this field shall be  
33 filled with spaces. Otherwise, only the last 39 bytes  
34 shall be included.

35  
36 octets 41-48: '0000XXX' or '0000XXXX', where XXX or XXXX is the  
37 decimal (ASCII coded) representation of the LPR/LPD  
38 job number.

#### 41 2.2 jmJobIndex Mapped to LPR/LPD

42  
43 The job index (jmJobIndex) is assigned by the SNMP job monitoring agent  
44 and is independent of the XXX (or XXXX) index assigned by the LPR/LPD  
45 client. This will allow the SNMP agent to track jobs received from  
46 multiple sources.

#### 49 2.3 Other MIB Objects Mapped to LPR/LPD

1	MIB Object	LPR/LPD Parameter
2	-----+-----	
3	jmJobKOctetsRequested	Number of bytes as defined in the Data File
4	jmJobOwner	Control file command code = P (User Id)
5		
6		

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.

13	MIB attribute	LPR/LPD information	Data type
14	-----+-----		
15	jobName	Name of the data file (note 1)	Octet String
16	queueNameRequested	Queue name from the Data File	Octet String
17	fileName	Source File Name (notes 2, 3)	Octet String
18	documentName	Document title (notes 2, 4)	Octet String

Notes:

-----

1. See section 2.1 (jmJobSubmissionId).
2. The information is optional in the Control File. The attribute should be included if present in the Control File.
3. Control file command code = N.
4. Control file command code = J.

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.

1  
2     octet 1:     'A'  
3  
4     octets 2-40:  Contains the AppleTalk printer name, with the first  
5                    character of the name in octet 2.  AppleTalk printer  
6                    names are a maximum of 31 characters.  Any unused  
7                    portion of this field shall be filled with spaces.  
8  
9     octets 41-48:  '00000XXX', where 'XXX' is the decimal (ASCII coded)  
10  \_\_\_\_\_ representation of the Connection Id.

### 11 12 13 3.2 Other AppleTalk Mappings

14  
15 No other Job MIB objects or parameters can be derived from information  
16 available in the AppleTalk headers  
17

### 18 19 4.0 INTERNET PRINTING PROTOCOL (IPP)

20  
21 The Internet Printing Protocol [IPP] supports printing using any one of  
22 the three possible configurations.  For configuration 2, the mapping  
23 defined herein is performed on an agent within the server.  Otherwise,  
24 the mapping is performed on an agent within the printer.  
25

#### 26 27 4.1 jmJobSubmissionId Mapped to IPP

28  
29 IPP contains a rich set of parameters which allow several methods of  
30 creating the jmJobSubmissionId object.  To prevent interoperability  
31 problems, the preferred method is to use the IPP job-uri attribute as  
32 follows:  
33

34     octet 1:     '4'  
35  
36     octets 2-40:  Contains the IPP job-uri job descriptiontemplate  
37 attribute  
38                    generated by the printer.  (The job-uri is returned to  
39                    the client by IPP.)  If the job-uri is less than 40  
40                    octets, the left-most character in the string shall  
41                    appear in octet position 2.  Any unused portion of this  
42                    field shall be filled with spaces.  Otherwise, only the  
43                    last 39 bytes shall be included.  
44  
45     octets 41-48:  Contains the decimal (ASCII coded) representation of  
46                    the job-id job template attribute. Leading zeros shall  
47 be inserted to fill the entire 8 octet field.  
48  
49

1 4.2 jmJobIndex Mapped to IPP  
2

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

10  
11  
12 4.3 Other MIB Objects Mapped to IPP  
13

MIB Object	IPP Job <del>template</del> -attribute
jmJobOwner	job-originating-user
jmJobKOctetsRequested	job-k-octets
jmJobKOctetsProcessed	job-k-octets-processed
jmJobImpressionsRequested	job-impressions
jmJobImpressionsProcessed	job-impressions-completed
jmJobStateReasons1	job-state-reasons (note 1)
jmNumberOfInterveningJobs	number-of-intervening-jobs

23  
24 Notes:

- 25 -----  
26 1. JobStateReasons is a bit map described in one object and three  
27 attributes. The IPP condition may change one or more of the bits  
28 in one or more of these Job MIB items.  
29  
30

31 4.4 The Attribute Group Mapped to IPP  
32

33 The following mappings are required if the listed IPP job template  
34 attribute is provided.  
35

MIB attribute	IPP job <del>template</del> -attribute	
jobCodedCharSet	attributes-charset (note 1)	Octet String
jobNaturalLanguage	attributes-natural-language	Octet String
jobName	job-name	Octet String
documentFormat	document-format	Octet String
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	Integer
mediumRequested	media	Octet String
jobSubmissionTime	time-at-submission	Integer
jobStartedProcessingTime	time-at-processing	Integer

1	jobCompletionTime	time-at-completed	Integer
2	sheetsRequested	job-media-sheets	Integer
3	jobURI	job-uri	Octet String
4	jobStateReasonsN	job-state-reasons (note <u>31</u> )	Integer
5	physicalDevice	output-device-assigned	Octet String
6	sheetsCompleted	job-media-sheets-completed	Integer

7  
8 Notes:  
9 -----

- 10 1. jobCodedCharSet is an enum from the IANA registry which is also  
 11 used in the Printer MIB. The IPP attributes-charset is the name  
 12 (MIME preferred) of the character set.  
 13 2. The Job MIB sides attribute uses the enum values "1" and "2". The  
 14 IPP sides attribute uses three keywords.  
 15 31. jJobStateReasons is a bit map described in one object and three  
 16 attributes. The IPP condition may change one or more of the bits  
 17 in one or more of these Job MIB items.

18  
19  
20 5.0 INTELLIGENT PRINTER DATA STREAM (IPDS)

21  
22  
23 6.0 DOCUMENT PRINTING APPLICATION / PrintXchange (DPA)

24  
25  
26 7.0 NOVELL DISTRIBUTED PRINT SERVICE (NDPS)

27  
28 Novell Distributed Print Services is a DPA based job submission protocol  
 29 that conforms to configuration 3.

30  
31  
32 7.1 jmJobSubmissionId Mapped to NDPS

33  
34 NDPS supports the generation of a properly formatted jmJobSubmissionId  
 35 for use in the Job MIB.

36  
37  
38 7.2 jmJobIndex Mapped to NDPS

39  
40 NDPS does not provide a value that can be mapped to jmJobIndex.

41  
42  
43 7.3 Other MIB Objects Mapped to NDPS

MIB Object	NDPS Parameter
-----+-----	-----
47 jmJobOwner	

48  
49  
50 7.4 The Attribute Group Mapped to NDPS

51



1 The following mappings are required if the listed PDL attribute or  
 2 command option is provided.

3	4 MIB attribute	5   NDPS parameter	6   Data type
7	jobAccountName		
8	serverAssignedJobName		
9	jobName		
10	jobServiceTypes		
11	numberOfDocuments		
12	fileName		
13	documentName		
14	jobComment		
15	documentFormatIndex		
16	documentFormat		
17	jobPriority		
18	jobProcessAfterDateAndTime		
19	jobHoldUntil		
20	outputBin		
21	sides		
22	finishing		
23	printQualityRequested		
24	printerResolutionRequested		
25	jobCopiesRequested		
26	mediumRequested		
27	jobSubmissionToServerTime		
28	jobSubmissionTime		

29  
 30 8.0 PRINTER JOB LANGUAGE (PDL)

31  
 32 PDL [PDL] has been developed by Hewlett-Packard to provide job control  
 33 information to the printer and status information to applications,  
 34 independent of the PDL.

35  
 36  
 37 8.1 jmJobSubmissionId Mapped to PDL

38  
 39 PDL has defined the SUBMISSIONID option for the JOB command which  
 40 indicates a properly formatted jmJobSubmissionId for use in the Job MIB.  
 41 The PDL JOB command is presented at the start of a print job with  
 42 options that apply only the attached job. The syntax for this command  
 43 option is:

```
44     @PDL JOB SUBMISSIONID = "id string"
```

45  
 46  
 47 Driver software that implements this PDL command option must provide the  
 48 "id string" in one of the client version formats specified in the Job  
 49 MIB for jmJobSubmissionId.

50

1 For drivers that are not able to create the SUBMISSIONID option, it is  
 2 recommended that jmJobSubmissionId format 0 be created by the agent  
 3 using the PJL attribute DocOwner or DocOwnerId.

4  
 5     octet 1:     '0'  
 6  
 7     octets 2-40:  Contains the string associated with DocOwner or  
 8                   DocOwnerId.  If the string is less than 40 octets, the  
 9                   left-most character in the string shall appear in octet  
 10                   position 2.  Otherwise, only the last 39 bytes shall be  
 11                   included.  Any unused portion of this field shall be  
 12                   filled with spaces.  If DocOwner or DocOwnerId cannot be  
 13                   obtained, this field shall be blank.

14  
 15     octets 41-48:  Contains the value of jmJobIndex associated with the  
 16                   job. Leading zeros shall be inserted to fill the  
 17                   entire 8 octet field.

18  
 19  
 20 8.2 jmJobIndex Mapped to PJL

21  
 22 PJL does not provide a value that can be mapped to jmJobIndex.

23  
 24  
 25 8.3 The Attribute Group Mapped to PJL

26  
 27 The following mappings are required if the listed PJL attribute or  
 28 command option is provided.

MIB attribute	PJL attribute or command option	Data type
jobOwner	DocOwner or DocOwnerId attribute	Octet String
serverAssignedJobName	DocName attribute or the command @PJL JOB Name = "string"	Octet String
submittingServerName	SrcServerName attribute	Octet String
jobOriginatingHost	SrcPort attribute	Octet String
queueNameRequested	SrcQ attribute	Octet String
fileName	JobFName attribute	Octet String
jobComment	JobDesc attribute	Octet String
jobSubmissionTime	TimeSubmit attribute	Octet String

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 43 9.0 POSTSCRIPT

44  
 45 The PostScript PDL permits comment fields which are recommended to be  
 46 used by application drivers to include job information.  Although there  
 47 are no restrictions or requirements as to what information may be  
 48 included, many drivers include job owner and/or document name.

49  
 50 ~~Since there are no restrictions on the format of the comment fields, it~~  
 51 ~~must be expected that strings presented will vary considerably between~~

1 ~~different application drivers. As a result, the parsing of PostScript~~  
2 ~~comment fields may be complex.~~

### 4 9.1 jmJobSubmissionId Mapped to PostScript

6 The use of a standard format job submission id comment string will allow  
7 interoperability of printers and drivers from multiple vendors. The  
8 following comment string format is recommended.

10 % Job Submission Id = "id string"

12 where "id string" can be any jmJobSubmissionId format reserved for  
13 clients.

### 15 9.2 Other MIB Objects and Attributes Mapped to PostScript

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

20 ~~The recommended mapping is to use the job owner information string.~~

22 ~~— octet 1: — '0'~~

24 ~~— octets 2-40: — Contains the job owner string from the PostScript~~  
25 ~~comment. If the string is less than 40 octets, the~~  
26 ~~left-most character in the string shall appear in octet~~  
27 ~~position 2. Otherwise, only the last 39 bytes shall be~~  
28 ~~included. Any unused portion of this field shall be~~  
29 ~~filled with spaces. If the job owner string cannot be~~  
30 ~~obtained, this field shall be blank.~~

32 ~~— octets 41-48: — Contains the value of jmJobIndex associated with the~~  
33 ~~job.~~

35 ~~The alternative is to use the document name string.~~

37 ~~— octet 1: — new jmJobSubmissionId required~~

39 ~~— octets 2-40: — Contains the document name string from the PostScript~~  
40 ~~comment. If the string is less than 40 octets, the~~  
41 ~~left-most character in the string shall appear in octet~~  
42 ~~position 2. Otherwise, only the last 39 bytes shall be~~  
43 ~~included. Any unused portion of this field shall be~~  
44 ~~filled with spaces. If document name string cannot be~~  
45 ~~obtained, this field shall be blank.~~

47 ~~— octets 41-48: — Contains the value of jmJobIndex associated with the~~  
48 ~~job.~~

### 51 10.0 NETWARE PSERVER

1 The NetWare PServer job submission protocol is implemented in a client-  
 2 server-printer system on the server to printer link as defined in  
 3 configuration 3.

6 10.1 jmJobSubmissionId Mapped to PServer

8 octet 1: '??B' \*\*\*\*\* New format req'd, assigned by agent-??? \*\*\*\*\*

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

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

23 10.2 jmJobIndex Mapped to PServer

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

31 10.3 The Attribute Group Mapped to PServer

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

36 MIB attribute	PServer parameter	Data type
38 jobOwner	Client Id Number	Integer
39 serverAssignedJobName	Job File Name	Octet String
40 queueNameRequested	Queue Id	Integer
41 physicalDevice	Server Id Number	Integer
42 jobComment	Job Description	Octet String
43 jobPriority	<u>Job Position (note 1)</u>	<u>Integer</u>
44 jobProcessAfterDateAndTime	Target Execution Time	Octet String
45 <del>jobHoldUntil</del>		
46 jobCopiesRequested	Number of Copies	Integer
47 mediumRequested	Form Name	Octet String
48 jobSubmittedToServerTime	Job Entry Time	Octet String

50 Notes:

- 51 -----  
 52 1. Job Position equal to 1 indicates the next job to be printed.

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## 11.0 NETWARE NPRINT or RPRINT

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 PJI 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' \*\*\*\* New format for SMB req'd, assigned by agent \*\*\*\*

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

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12.3 Other MIB objects Mapped to SMB

<u>MIB Object</u>	<u>SMB Parameter</u>
<u>jmJobOwner</u>	<u>SMB User Id field (note 1)</u>

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)

13.1 jmJobSubmissionId Mapped to TIP/SI

octet 1: 'D' \*\*\* New format for TIP/SI req'd, assigned by agent \*\*\*

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 SMB, the maximum jmJobIndex is 65,535.

13.3 Other MIB Objects Mapped to TIP/SI

<u>MIB Object</u>	<u>TIP/SI Parameter</u>
<u>jmJobOwner</u>	<u>User string</u>

13.4 The Attribute Group Mapped to TIP/SI

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

#### 14.0 REFERENCES

- [IPP] The Internet Printing Protocol RFC XXXX, Model RFC XXXX
- [JobMIB] The Job Monitoring MIB, RFC XXXX, IETF informational document.
- [LPD] Line Printer Daemon Protocol, RFC 1179, IETF informational document.
- [PJL] Printer Job Language Technical Reference Manual, Hewlett-Packard part number 5021-0328.
- [PrtMIB] The Printer MIB, RFC 1759, IETF standards track document.

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