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8  
9 Internet Printing Protocol/1.1: Notifications over SNMP  
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30  
31  
32 Abstract

33  
34 This document is a submission to the Internet Printing Protocol  
35 Working Group of the Internet Engineering Task Force (IETF).  
36 Comments should be submitted to the [ipp@pwg.org](mailto:ipp@pwg.org) mailing list.

37  
38 This document proposes a mapping of IPP notifications over SNMP,  
39 using new Printer Event and Job Event traps (to be added to the PWG  
40 Job Monitoring MIB [PWG-JOB]). This mapping may be used to deliver  
41 printer notifications for any printer (not just IPP-capable ones) and  
42 also job notifications for any job (not just ones submitted via IPP).

43  
44 This document proposes: (2) SNMP traps; and (7) SNMP leaf objects  
45 (for use in trap bindings).

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117  
118 1. Introduction  
119

120 The IPP protocol [IPP-PRO] supports passive monitoring of IPP Printer  
121 and Job objects, via client polling of IPP object attributes using  
122 the 'Get-Printer-Attributes' and 'Get-Job-Attributes' operations.  
123

124 This IPP Notifications over SNMP mapping supports dynamic monitoring  
125 of IPP Printer and Job objects, via server generation of SNMP traps.  
126

127  
128 1.1. Terminology for Conformance  
129

130 The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",  
131 "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this  
132 document are to be interpreted per [RFC-2119].  
133

134  
135 2. SNMP Network Management Framework  
136

137 See: Section 1 'Introduction' and section 2 'Management Information'  
138 of IETF Coexistence between SNMPv1 and SNMPv2 [RFC-1908].  
139

140 See: Section 1.1 'SNMPv1', section 1.2 'SNMPv2', and section 1.3  
141 'SNMPv3' of IETF Coexistence between SNMP Versions [V3-COEX].  
142

143  
144 3. Managed Object Mapping  
145

146  
147  
148 3.1. SNMP Mapping for IPP Printer Events  
149

150 IPP Printer event attribute	Printer/Job MIB object mapping
151 -----	-----
152 version-number	[no mapping - not useful]
153 status-code	[implicit in generated trap]
154 request-id	[request-id in SNMP trap header]
155 attributes-charset	[no mapping - strings are UTF-8]
156 attributes-natural-language	[no mapping - no text bindings]
157 printer-uri	[prtChannelInformation in PMv2]
158 printer-name	[prtGeneralPrinterName in PMv2]
159 job-id	jmJobIndex in OID instance suffix
160 job-name	jobName
161 trigger-event	jmEventTriggerEvent
162 trigger-time	[time-stamp in SNMP trap header]
163 trigger-date-time	hrSystemDate in Host Res MIB
164 subscription-id	jmEventSubscriptionID
165 subscriber-user-name	jmEventSubscriberUserName
166 subscriber-user-data	jmEventSubscriberUserData

172	printer-state	jmEventEventPrinterState
173		hrDeviceStatus in Host Res MIB
174		hrPrinterStatus in Host Res MIB
175	printer-state-reasons	jmEventPrinterStateReasons
176		hrPrinterDetectedErrorState
177		in Host Res MIB
178	printer-is-accepting-jobs	jmEventPrinterIsAcceptingJobs
179		

180  
 181 3.2. SNMP Mapping for IPP Job Events

182  
 183 IPP Job event attribute                    Printer/Job MIB object mapping  
 184 -----

185	version-number	[no mapping - not useful]
186	status-code	[implicit in generated trap]
187	request-id	[request-id in SNMP trap header]
188	attributes-charset	[no mapping - strings are UTF-8]
189	attributes-natural-language	[no mapping - no text bindings]
190	printer-uri	[prtChannelInformation in PMv2]
191	printer-name	[prtGeneralPrinterName in PMv2]
192	job-id	jmJobIndex in OID instance suffix
193	job-name	jobName
194	trigger-event	jmEventTriggerEvent
195	trigger-time	[time-stamp in SNMP trap header]
196	trigger-date-time	hrSystemDate in Host Res MIB
197	subscription-id	jmEventSubscriptionID
198	subscriber-user-name	jmEventSubscriberUserName
199	subscriber-user-data	jmEventSubscriberUserData
200	job-state	jmJobState
201	job-state-reasons	jmJobStateReasons1
202		jmJobStateReasons2
203		jmJobStateReasons3
204		jmJobStateReasons4
205		
206	[ job-completed state-changed purged	- extra bindings]
207	job-k-octets-processed	jmJobKOctetsProcessed
208	job-impressions-completed	jmJobImpressionsCompleted
209	job-media-sheets-completed	sheetsCompleted
210		

211	[job-progress - extra bindings]	
212	job-collation-type	jobCollationType
213	sheet-completed-copy-number	sheetCompletedCopyNumber
214	sheet-completed-document-number	sheetCompletedDocumentNumber
215	impressions-interpreted	impressionsInterpreted
216	impressions-completed-current-copy	impressionsCompletedCurrentCopy
217		

218  
 219 3.3. Rules for Encoding Notifications

220  
 221 Over some transports and/or media, the variable-bindings of these  
 222 SNMP traps MAY not fit the MTU (maximum transmission unit) size.  
 223

228 Conforming IPP Notification generators SHALL perform this procedure  
229 to ensure that all variable-bindings of these SNMP traps are always  
230 included in the generated SNMP trap packet:  
231

- 232 1) Truncate all strings specified for variable-bindings  
233 to the reduced maximum sizes that are specified in their  
234 corresponding OBJECT clauses in their MODULE-COMPLIANCE.
- 235 1a) If all variable-bindings now fit within the MTU,  
236 then exit this procedure and generate the SNMP trap.
- 237 2) Truncate the next one of the following string objects to  
238 the empty string (zero length in the ASN.1 BER encoding),  
239 in the order listed:
  - 240 - 'prtChannelInformation' (from Printer MIB v2 [PRT-MIB2])
  - 241 - 'prtGeneralPrinterName' (from Printer MIB v2 [PRT-MIB2])
  - 242 - 'jmEventSubscriberUserName'
  - 243 - 'jmEventSubscriberUserData'
  - 244 - 'jmAttributeValue...jobName.1'
  - 245 - 'jmEventPrinterStateReasons'
  - 246 - 'jmEventPrinterState'
- 247 2a) If all variable-bindings now fit within the MTU,  
248 then exit this procedure and generate the SNMP trap.
- 249 2b) If all variable-bindings do NOT fit within the MTU,  
250 then repeat step (2) for next string object.
- 251 3) If all variable-bindings do NOT fit within the MTU,  
252 then -> logic error (variable-bindings MUST now fit).

253  
254  
255 3.4. Registration for IPP Notifications

256  
257 IPP Clients may register for IPP Notifications delivered via SNMP by  
258 either of the following methods:  
259

260  
261 3.4.1. Registration via IPP

262  
263 IPP Create-Subscription and Job creation (Create-Job, Print-Job,  
264 Print-URI) operations MAY be used to create per-Printer or per-Job  
265 IPP Subscription objects and MAY specify

266  
267 'notify-recipient' = 'ipp-snmp://hostname[.port]'

268  
269  
270 3.4.2. Registration via SNMP

271  
272 SNMP Set-Request operations MAY be used to create appropriate rows in  
273 the SNMP Notification MIB defined in [RFC-2573] and MAY specify:

- 274  
275 1) 'snmpNotifyTag'
  - 276 - tag of this notification - see 'snmpTargetAddrTagList' below
  - 277 - example "jmPrinterEventV2Event" or "jmJobEventV2Event"
- 278 2) 'snmpNotifyType'

284            - notification sent using either SNMP Trap (unacknowledged)  
285            or SNMP Inform-Request (acknowledged)

286 3) 'snmpNotifyStorageType'  
287            - row persistence of this registration  
288

289  
290 SNMP Set-Request operations MAY be used to create appropriate rows in  
291 the SNMP Target MIB defined in [RFC-2573] and MAY specify:  
292

- 293 1) 'snmpTargetAddrTDomain' and 'snmpTargetAddrTAddress'  
294            - target transport protocol and address (equivalent to URI)  
295 2) 'snmpTargetAddressTimeout' and 'snmpTargetAddrRetryCount'  
296            - retry timeout and limit (for acknowledged notifications  
297            delivered using SNMP Inform-Request rather than SNMP Trap)  
298 3) 'snmpTargetAddrTagList'  
299            - tags of notifications to be sent to this target (client)  
300            - example value "jmPrinterEventV2Event jmJobEventV2Event"  
301 4) 'snmpTargetAddrParamsEntry'  
302            - notification security and SNMP protocol version  
303 5) 'snmpTargetAddrStorageType'  
304            - row persistence of this registration  
305

306  
307 3.5. Relationship to other MIBs  
308

309  
310  
311 3.5.1. IETF Host Resources MIB (RFC 1514)  
312

313 The 'jmPrinterEventV2Event' trap defined in this document includes a  
314 'hrDeviceStatus' object for a device of type 'hrDevicePrinter'. The  
315 'jmPrinterEventV2Event' trap defined in this document includes four  
316 objects from the IETF HR MIB [RFC-1514] in the variable-bindings:  
317

318 - 'hrDeviceStatus'                    --> IPP 'printer-state'  
319 - 'hrPrinterStatus'                    --> IPP 'printer-state'  
320 - 'hrPrinterDetectedErrorState' --> IPP 'printer-state-reasons'  
321 - 'hrSystemDate'                      --> IPP 'printer-current-time'  
322

323  
324 3.5.2. IETF Printer MIB (RFC 1759)  
325

326 The 'jmPrinterEventV2Event' trap defined in this document includes a  
327 'hrDeviceStatus' object for a device of type 'hrDevicePrinter'. The  
328 appropriate 'hrDeviceIndex' to use in the companion IETF Printer MIB  
329 [RFC-1759] is indicated by the instance suffix of the variable's OID.  
330

341  
342 3.5.3. Printer MIB v2 (work-in-progress)  
343

344 The 'jmPrinterEventV2Event' trap defined in this document includes  
345 two objects from the (work-in-progress) Printer MIB v2 [PRT-MIB2] in  
346 the variable-bindings:  
347

- 348 - 'prtGeneralPrinterName'                    --> IPP 'printer-name'
- 349 - 'prtChannelInformation'                    --> IPP 'printer-uri'





452            in the (work-in-progress) IPP Model and Semantics [IPP-MOD]  
453            SHOULD add  
454            'jmEventPrinterState' (corresponds to IPP 'printer-state'),  
455            'jmEventPrinterStateReasons' (corresponds to IPP  
456            'printer-state-reasons'), and  
457            'jmEventPrinterIsAcceptingJobs' (corresponds to IPP  
458            'printer-is-accepting-jobs')  
459            - Systems that support 'prtChannelInformation' defined in  
460            the (work-in-progress) Printer MIB v2 [PRT-MIB2] SHOULD add  
461            'prtChannelInformation' (corresponds to IPP 'printer-uri')  
462            - Systems that support 'prtGeneralPrinterName' defined in  
463            the (work-in-progress) Printer MIB v2 [PRT-MIB2] SHOULD add  
464            'prtGeneralPrinterName' (compare to IPP 'printer-name')  
465  
466            Systems MAY add other variable-bindings from any MIB."  
467            ::= { jmPrinterEventV2EventPrefix 1 }  
468  
469

#### 470 4.2. Job Event Trap

471  
472 -- Job Event Group (Cond Mandatory)  
473 --  
474 -- Implementation of this group is conditionally mandatory;  
475 -- mandatory for systems which send this Job event via SNMP.  
476  
477 jmJobEventV1Enterprise OBJECT-IDENTITY  
478        STATUS        current  
479        DESCRIPTION  
480        "The value of the enterprise-specific OID in an SNMPv1 trap  
481        for a 'basic-job-event' sent by this managed system."  
482        ::= { jobmonMIBNotifications 2 }  
483  
484 jmJobEventV2EventPrefix  
485        OBJECT IDENTIFIER ::= { jmJobEventV1Enterprise 0 }  
486  
487 jmJobEventV2Event NOTIFICATION-TYPE  
488        OBJECTS {  
489            jmEventTriggerEvent,  
490            jmEventSubscriptionID,  
491            jmEventSubscriberUserName,  
492            jmEventSubscriberUserData,  
493            jmJobState,  
494            jmJobStateReasons1  
495        }  
496        STATUS        current  
497        DESCRIPTION  
498        "This SMIV2 trap corresponds to an IPP 'basic-job-event'.  
499  
500        This trap is sent when requested by a prior subscription for  
501        the included job-level 'jmEventTriggerEvent'.  
502  
503

508  
509        Additional variable-bindings SHALL be appended to this trap  
510        for all job-level events:

- 511        - Systems that support 'jobName' SHALL add
- 512            'jmAttributeValue...jobName.1'
- 513        - Systems that support 'jobStateReasonsN' SHALL add
- 514            'jmAttributeValue...jobStateReasonsN.1'
- 515        - Systems that support 'hrSystemDate' defined in
- 516            the IETF Host Resources MIB (RFC 1514) SHALL add
- 517            'hrSystemDate' (corresponds to IPP 'printer-current-time')

518  
519        Additional variable-bindings SHOULD be appended to this trap  
520        for all job-level events:

- 521        - Systems that support 'prtChannelInformation' defined in
- 522            the (work-in-progress) Printer MIB v2 [PRT-MIB2] SHOULD add
- 523            'prtChannelInformation' (corresponds to IPP 'printer-uri')
- 524        - Systems that support 'prtGeneralPrinterName' defined in
- 525            the (work-in-progress) Printer MIB v2 [PRT-MIB2] SHOULD add
- 526            'prtGeneralPrinterName' (corresponds to IPP 'printer-name')

527  
528        Additional variable-bindings SHALL be appended to this trap  
529        for 'jobCompleted', 'jobStateChanged', or 'jobPurged':

- 530        - Systems SHALL add
- 531            'jmJobKOctetsProcessed'
- 532            'jmJobImpressionsCompleted'
- 533        - Systems that support 'sheetsCompleted' SHALL add
- 534            'jmAttributeValue...sheetsCompleted.1'

535  
536        Additional variable-bindings SHALL be appended to this trap  
537        for 'jobProgress':

- 538        - Systems that support the respective attributes SHALL add
- 539            'jmAttributeValue...jobCollationType.1'
- 540            'jmAttributeValue...sheetCompletedCopyNumber.1'
- 541            'jmAttributeValue...sheetCompletedDocumentNumber.1'
- 542            'jmAttributeValue...impressionsInterpreted.1'
- 543            'jmAttributeValue...impressionsCompletedCurrentCopy.1'

544  
545        Systems MAY add other variable-bindings from any MIB."

546        ::= { jmJobEventV2EventPrefix 1 }

547  
548  
549        4.3. Event Objects

- 550
- 551        -- Event Group (Cond Mandatory)
- 552        --
- 553        -- Implementation of this group is conditionally mandatory;
- 554        -- mandatory for systems which send Printer or Job events via SNMP.

555  
556        jmEvent                    OBJECT IDENTIFIER ::= { jobmonMIBObjects 5 }

564     jmEventTriggerEvent OBJECT-TYPE  
565         SYNTAX            JmUTF8StringTC (SIZE (0..63))     -- 255 in [IPP-MOD]  
566         MAX-ACCESS        read-only  
567         STATUS            current  
568         DESCRIPTION  
569             "The trigger event type associated with this event."  
570  
571             Conformance:     The natural language for keywords  
572             in trigger event type SHALL always be US English.  
573  
574             Conformance:     This trigger event type SHALL be valid.  
575  
576             See:            Section 5.2 'notify-events' and  
577                                Section 7 'Notification Content' in [IPP-NOT]."  
578     -- DEFVAL intentionally omitted - reported value SHALL be valid  
579         ::= { jmEvent 1 }  
580

581     jmEventSubscriptionID OBJECT-TYPE  
582         SYNTAX            Integer32 (0..2147483647)  
583         MAX-ACCESS        read-only  
584         STATUS            current  
585         DESCRIPTION  
586             "The subscription identifier associated with this event  
587             or zero (if none)."  
588  
589             Conformance:     This subscription identifier SHALL be valid  
590             and non-zero, if available on this managed system.  
591  
592             See:            Section 5.8 'subscription-id' and  
593                                Section 7 'Notification Content' in [IPP-NOT]."  
594         DEFVAL            { 0 }                                -- no subscription ID  
595         ::= { jmEvent 2 }  
596

597     jmEventSubscriberUserName OBJECT-TYPE  
598         SYNTAX            JmUTF8StringTC (SIZE (0..63))     -- 1023 in [IPP-MOD]  
599         MAX-ACCESS        read-only  
600         STATUS            current  
601         DESCRIPTION  
602             "The subscriber user name associated with this event  
603             or the empty string (if none)."  
604  
605             Note:            The natural language appropriate for text-to-speech  
606             of subscriber user name is orthogonal to the localized text  
607             context in IPP 'attributes-natural-language'. The subscriber  
608             user name MAY include an in-line 'language tag' using Plane  
609             14 'language tag' characters approved for ISO 10646/Unicode.  
610  
611             Conformance:     This subscriber user name SHALL be valid  
612             and conserved, if available on this managed system.  
613  
614             See:            'Language Tagging in Unicode Plain Text', RFC 2482  
615

620            (January 1999);  
621            'Plane 14 Characters for Language Tags', Unicode  
622            Technical Report #7 (January 1999);  
623            Section 4.3.6 'job-originating-user-name' and  
624            Section 4.4.2 'uri-authentication-supported'  
625            (usage of 'requesting-user-name') in [IPP-MOD];  
626            Section 5.11 'subscriber-user-name' and  
627            Section 7 'Notification Content' in [IPP-NOT]."  
628        DEFVAL        { 'H }                            -- no subscriber user name  
629        ::= { jmEvent 3 }

630  
631        jmEventSubscriberUserData OBJECT-TYPE  
632        SYNTAX        OCTET STRING (SIZE (0..63))        -- 63 in [IPP-NOT]  
633        MAX-ACCESS    read-only  
634        STATUS        current  
635        DESCRIPTION  
636            "The subscriber user data associated with this event  
637            or the empty string (if none).  
638  
639            Conformance:    This subscriber user data SHALL be valid  
640            and conserved, if available on this managed system.  
641  
642            See:            Section 5.4 'subscriber-user-data' and  
643                            Section 7 'Notification Content' in [IPP-NOT]."  
644        DEFVAL        { 'H }                            -- no subscriber user data  
645        ::= { jmEvent 4 }

646  
647        jmEventPrinterState OBJECT-TYPE  
648        SYNTAX        OCTET STRING (SIZE (0..31))        -- 255 in [IPP-MOD]  
649        MAX-ACCESS    read-only  
650        STATUS        current  
651        DESCRIPTION  
652            "The printer state associated with this event  
653            or the empty string (if none).  
654  
655            Note:            This object uses the keywords from the [IPP-MOD]  
656            enumerated type 'printer-state', to avoid adding a new  
657            textual convention to the PWG Job Monitoring MIB [PWG-JOB].  
658  
659            Conformance:    The natural language for keywords  
660            in printer state SHALL always be US English.  
661  
662            Conformance:    This printer state SHALL be valid  
663            and non-empty, if available on this managed system.  
664  
665            See:            Section 4.4.11 'printer-state' in [IPP-MOD];  
666                            Section 7 'Notification Content' in [IPP-NOT]."  
667        DEFVAL        { 'H }                            -- no printer state  
668        ::= { jmEvent 5 }

676     jmEventPrinterStateReasons OBJECT-TYPE  
677         SYNTAX           OCTET STRING (SIZE (0..255))     -- 255\*n in [IPP-MOD]  
678         MAX-ACCESS     read-only  
679         STATUS           current  
680         DESCRIPTION  
681             "The printer state reasons associated with this event  
682             (as a comma-separated list) or the empty string (if none).  
683  
684             Conformance:     The natural language for keywords  
685             in printer state reasons SHALL always be US English.  
686  
687             Conformance:     These printer state reasons SHALL be valid  
688             and conserved, if available on this managed system.  
689  
690             See:            Section 4.4.12 'printer-state-reasons' in [IPP-MOD];  
691                            Section 7 'Notification Content' in [IPP-NOT]."  
692         DEFVAL           { 'H' }                     -- no printer state reasons  
693         ::= { jmEvent 6 }

694  
695     jmEventPrinterIsAcceptingJobs OBJECT-TYPE  
696         SYNTAX           TruthValue  
697         MAX-ACCESS     read-only  
698         STATUS           current  
699         DESCRIPTION  
700             "The printer substate associated with this event  
701             or 'true' (if unknown).  
702  
703             Conformance:     This printer substate SHALL be valid  
704             and conserved, if available on this managed system.  
705  
706             See:            Section 4.4.23 'printer-is-accepting-jobs'  
707                            in [IPP-MOD];  
708                            Section 7 'Notification Content' in [IPP-NOT]."  
709         DEFVAL           { true }                    -- printer is accepting jobs  
710         ::= { jmEvent 7 }

733  
734 5. IANA Considerations  
735

736       None - no enumerated textual conventions are defined in this  
737       document.  
738

739  
740 6. Internationalization Considerations  
741

742       The 'jmEventTriggerEvent', 'jmEventPrinterState', and  
743       'jmEventPrinterStateReasons' text objects defined in this document  
744       are of type 'JmUTF8StringTC' (UTF-8 stream-encoded ISO 10646/Unicode  
745       text) defined in the PWG Job Monitoring MIB [PWG-JOB]. The natural  
746       language of these objects is US English.  
747

748       The 'jmEventSubscriberUserName' text object defined in this document  
749       is of type 'JmUTF8StringTC' (UTF-8 stream-encoded ISO 10646/Unicode  
750       text) defined in the PWG Job Monitoring MIB [PWG-JOB]. The natural  
751       language of this object is inherently ambiguous (as it usually  
752       contains some transform of a personal name).  
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755 7. Security Considerations  
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757       This IPP Notifications over SNMP mapping defines only 'read-only'  
758       objects. It is suitable for use with any version of SNMP, as no  
759       update security is required (because no configuration updates are  
760       supported).  
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762       No sensitive information is available via IPP Notifications over  
763       SNMP.  
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790 8. References

791        To be supplied.  
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795 9. Change Log

796        Changes in reverse chronological order (most recent first).  
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799 <draft-ietf-ipp-not-over-snmpp-01.txt> - 1 December 1999

- 800 1) Deleted 'JmTriggerEventTC' textual convention (see below).  
801 2) Revised SYNTAX of 'jmEventTriggerEvent' object from  
802        'JmTriggerEventTC' (enumeration) to 'JmUTF8StringTC' (string), to  
803        support use of IPP standard keywords.  
804 3) Added 'jmEventPrinterState', 'jmEventPrinterStateReasons', and  
805        'jmEventPrinterIsAcceptingJobs' objects for consistency w/  
806        [IPP-NOT] and to reduce ambiguity about printer states inherent  
807        in RFC 1759.  
808 4) Revised DESCRIPTION of 'jmPrinterEventV2Event' notification to  
809        add SHOULD (recommendation) for 'jmEventPrinterState',  
810        'jmEventPrinterStateReasons', and 'jmEventPrinterIsAcceptingJobs'  
811        objects.  
812 5) Revised 'SNMP Mapping for IPP Printer Events' section to add  
813        direct mapping of IPP notification attributes to  
814        'jmEventPrinterState', 'jmEventPrinterStateReasons', and  
815        'jmEventPrinterIsAcceptingJobs' objects.  
816 6) Revised 'Rules for Encoding Notifications' section to add  
817        'jmEventPrinterState' and 'jmEventPrinterStateReasons'.  
818 7) Revised 'IANA Considerations' section to specify there are none -  
819        no enumerated or keyword textual conventions are now defined in  
820        this document.  
821 8) Revised 'Internationalization Considerations' section to specify  
822        that US English keywords are used in 'jmEventTriggerEvent',  
823        'jmEventPrinterState', and 'jmEventPrinterStateReasons' objects  
824        and thus no explicit natural language tagging is required.

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826 <draft-ietf-ipp-not-over-snmpp-00.txt> - 10 October 1999

- 827 1) Initial version.  
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