Internet Printing Protocol (IPP):
Notifications over SNMP via Job Monitoring MIB Traps

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Status of this Memo

This document is a submission to the Internet Printing Protocol
Working Group of the Internet Engineering Task Force (IETF).
Comments should be submitted to the ipp@pwg.org mailing list.

This document proposes a mapping of IPP notifications over SNMP via
new service and job trap extensions defined for the Job Monitoring
MIB [RFC 2707]. This mapping may be used to deliver printer
notifications for any printer (not just IPP-capable ones) and also
job notifications for any job (not just ones submitted via IPP).

This document proposes (4) new object groups and (4) new SNMP traps
for addition to the Job Monitoring MIB [RFC 2707]. A working copy of
this proposal integrated into the original Job Monitoring MIB ASN.1
is at:
Table of Contents

1. Introduction ............................................. 3
   1.1. Terminology for Conformance ............................ 3
2. SNMP Network Management Framework .......................... 3
3. Managed Object Mapping ..................................... 4
   3.1. SNMP Mapping for IPP Notifications .................... 4
      3.1.1. SNMP Mapping for IPP Printer Events ............... 4
      3.1.2. SNMP Mapping for IPP Job Events .................. 5
   3.2. Subscription for IPP Notifications ..................... 6
      3.2.1. Subscription via IPP ................................ 6
      3.2.2. Subscription via SNMP ............................. 6
   3.3. Relationship to other MIBs ............................. 7
      3.3.1. MIB-II (RFC 1213) ................................ 7
      3.3.2. Host Resources MIB (RFC 2790) ..................... 7
      3.3.3. Printer MIB (RFC 1759) ........................... 7
4. Managed Object Definitions ................................... 8
   4.1. Notification Definitions ............................... 8
      4.1.1. Service Basic Event - Trap ....................... 8
      4.1.2. Job Basic Event - Trap ............................ 9
      4.1.3. Job Completed Event - Trap ....................... 11
      4.1.4. Job Progress Event - Trap ....................... 12
   4.2. Object Definitions .................................... 13
      4.2.1. Service Group - Objects ......................... 13
      4.2.2. Service Event Group - Objects .................... 16
      4.2.3. Job Event Group - Objects ....................... 19
      4.2.4. Job Progress Group - Objects ................... 22
5. IANA Considerations ....................................... 24
6. Internationalization Considerations ........................ 24
7. Security Considerations .................................... 24
8. References ................................................ 25
9. Change Log ................................................ 26
10. Intellectual Property Notice ................................ 29
11. Authors’ Addresses ....................................... 29
12. Full Copyright Statement .................................. 30
1. Introduction

This document is a submission to the Internet Printing Protocol Working Group of the Internet Engineering Task Force (IETF). Comments should be submitted to the ipp@pwg.org mailing list.

This document proposes a mapping of IPP notifications over SNMP via new service and job trap extensions defined for the Job Monitoring MIB [RFC-2707]. This mapping may be used to deliver printer notifications for any printer (not just IPP-capable ones) and also job notifications for any job (not just ones submitted via IPP).

This document proposes (4) new object groups and (4) new SNMP traps for addition to the Job Monitoring MIB [RFC 2707]. A working copy of this proposal integrated into the original Job Monitoring MIB ASN.1 is at:

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

This document proposes support for dynamic monitoring of IPP Printer and Job objects via SNMP traps generated by the service provider (server or device).

1.1. Terminology for Conformance

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

2. SNMP Network Management Framework

See: Section 1.1 'SNMPv1', section 1.2 'SNMPv2', and section 1.3 'SNMPv3' of [RFC-2576].
3. Managed Object Mapping

3.1. SNMP Mapping for IPP Notifications

3.1.1. SNMP Mapping for IPP Printer Events

<table>
<thead>
<tr>
<th>IPP Printer event attribute</th>
<th>Job Monitoring MIB object mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>version-number</td>
<td>[no mapping - not useful]</td>
</tr>
<tr>
<td>status-code</td>
<td>[implicit in each generated trap]</td>
</tr>
<tr>
<td>notify-sequence-number</td>
<td>[request-id in SNMP trap header]</td>
</tr>
<tr>
<td>notify-charset</td>
<td>[no mapping - strings are UTF-8]</td>
</tr>
<tr>
<td>notify-natural-language</td>
<td>[no mapping - no text bindings]</td>
</tr>
<tr>
<td>subscription-id</td>
<td>[no mapping]</td>
</tr>
<tr>
<td>notify-subscribed-event</td>
<td>jmServiceEventNotifyEvent</td>
</tr>
<tr>
<td>notify-printer-uri</td>
<td>jmServiceURI</td>
</tr>
<tr>
<td>printer-up-time</td>
<td>[sysUpTime in SNMP trap bindings]</td>
</tr>
<tr>
<td>printer-current-time</td>
<td>[hrSystemDate in Host Res MIB]</td>
</tr>
<tr>
<td>notify-user-data</td>
<td>[no mapping]</td>
</tr>
<tr>
<td>notify-text</td>
<td>[no mapping]</td>
</tr>
<tr>
<td>printer-state</td>
<td>jmServiceState</td>
</tr>
<tr>
<td>printer-state-reasons</td>
<td>jmServiceStateReasons</td>
</tr>
<tr>
<td>printer-is-accepting-jobs</td>
<td>[jmServiceStateReasons keyword]</td>
</tr>
</tbody>
</table>
### 3.1.2. SNMP Mapping for IPP Job Events

<table>
<thead>
<tr>
<th>IPP Job event attribute</th>
<th>Job Monitoring MIB object mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>version-number</td>
<td>[no mapping - not useful]</td>
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<td>subscription-id</td>
<td>[no mapping]</td>
</tr>
<tr>
<td>notify-subscribed-event</td>
<td>jmJobEventNotifyEvent</td>
</tr>
<tr>
<td>notify-printer-uri</td>
<td>jmServiceURI</td>
</tr>
<tr>
<td>job-id</td>
<td>[via jmJobState OID instance]</td>
</tr>
<tr>
<td>printer-up-time</td>
<td>[sysUpTime in SNMP trap bindings]</td>
</tr>
<tr>
<td>printer-current-time</td>
<td>[hrSystemDate in Host Res MIB]</td>
</tr>
<tr>
<td>notify-user-data</td>
<td>[no mapping]</td>
</tr>
<tr>
<td>notify-text</td>
<td>[no mapping]</td>
</tr>
<tr>
<td>job-state</td>
<td>jmJobState</td>
</tr>
<tr>
<td>job-state-reasons</td>
<td>[jmJobStateReasons1 plus zero or more jobStateReasonsN in a strin]</td>
</tr>
</tbody>
</table>

[job-completed and job-purged - extra bindings]

| job-k-octets-processed                  | jmJobKOctetsProcessed                                                                         |
| job-impressions-completed              | jmJobImpressionsCompleted                                                                      |

[job-progress - extra bindings]

| job-k-octets                           | jmJobKOctetsPerCopyRequested                                                                  |
| job-impressions                        | jmJobImpressionsPerCopyRequested                                                             |
| job-copies                             | jmProgressJobCopiesRequested                                                                 |
| job-collation-type                     | jmProgressJobCollationType                                                                    |
| job-media-sheets-completed             | jmProgressMediaSheetsCompleted                                                                |
| sheet-completed-copy-number            | jmProgressSheetCompletedCopyNum                                                              |
| sheet-completed-document-number        | jmProgressSheetCompletedDocNum                                                               |
3.2. Subscription for IPP Notifications

IPP Clients MAY subscribe for IPP Notifications delivered via SNMP by either of the following two standard methods:

3.2.1. Subscription via IPP

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

"notify-recipient-uri" = 'snmpnotify://hostname[.port]'

"notify-events" = <events of interest, e.g., ‘job-completed’>

3.2.2. Subscription via SNMP

The SNMP Notification MIB and SNMP Target MIB (both in [RFC-2573]) MAY be used to create SNMP subscriptions.

To create a subscription via SNMP, the IPP Client MAY use an SNMP Set-Request operation to create an appropriate row in the SNMP Notification MIB with the following variable-bindings:

1) ‘snmpNotifyTag’
   - tag of this notification - see ‘snmpTargetAddrTagList’ below
2) ‘snmpNotifyType’
   - deliver via SNMP Trap (unacknowledged) or Inform (acknowledged)
3) ‘snmpNotifyStorageType’
   - persistence (volatile, nonVolatile, permanent, readOnly)

Note: The SNMP Notification MIB uses persistence instead of the lease duration supported in IPP Subscription objects.

To complete a subscription via SNMP, the IPP Client MAY use an SNMP Set-Request operation to create an appropriate row in the SNMP Target MIB with the following variable-bindings:

1) ‘snmpTargetAddrDomain’ and ‘snmpTargetAddrAddress’
   - notification target (client) transport protocol and address
     (corresponds to IPP ‘notify-recipient-uri’)
2) ‘snmpTargetAddressTimeout’ and ‘snmpTargetAddrRetryCount’
   - retry timeout and limit (for acknowledged SNMP Inform only)
3) ‘snmpTargetAddrTagList’
   - tags of notifications to be sent to this target (client)
4) ‘snmpTargetAddrParamsEntry’
3.3. Relationship to other MIBs

3.3.1. MIB-II (RFC 1213)

All SNMPv1 trap messages include ‘time-stamp’ which is the value of the ‘sysUpTime’ object from MIB-II [RFC-1213].

All SNMPv2 trap bindings include the ‘sysUpTime’ object from MIB-II [RFC-1213].

3.3.2. Host Resources MIB (RFC 2790)

The ‘jmServiceTable’ defined in this document MAY have a sparse mapping to the ‘hrDeviceTable’ (same indices) in Host Resources MIB [RFC-2790].

3.3.3. Printer MIB (RFC 1759)

The ‘jmServiceTable’ defined in this document MAY have a sparse mapping to the ‘hrDeviceTable’ (same indices) in Host Resources MIB [RFC-2790], thus offering access to the Printer MIB via a ‘hrDeviceIndex’ value.
4. Managed Object Definitions

4.1. Notification Definitions

4.1.1. Service Basic Event - Trap

-- Service Basic Event Group (CONDITIONALLY MANDATORY)
-- Implementation of this group is conditionally mandatory;
-- mandatory for systems which send this Service traps via SNMP.
-- The jmServiceBasicEventGroup consists entirely of the
-- jmServiceBasicV2Event notification.

jmServiceBasicV1Enterprise OBJECT-IDENTITY
STATUS current
DESCRIPTION
"The value of the enterprise-specific OID in an SNMPv1 trap
for a Service basic event sent by this managed system."
::= { jobmonMIBNotifications 1 }

jmServiceBasicV2EventPrefix
OBJECT IDENTIFIER ::= { jmServiceBasicV1Enterprise 0 }

jmServiceBasicV2Event NOTIFICATION-TYPE
OBJECTS {
    jmServiceEventNotifyEvent,
    jmServiceState,
    jmServiceStateReasons
}
STATUS current
DESCRIPTION
"This SMIv2 trap corresponds to an IPP Printer basic event.
The value of 'jmServiceIndex' for
use with 'jmServiceTable' for this Service is conveyed in the
instance qualifier (OID suffix) of 'jmServiceState'.

This trap is sent when requested by a prior subscription.
The subscribed event type is in 'jmServiceEventNotifyEvent'.

Standard Printer event types defined in [IPP-NOT] are:
- 'printer-state-changed'
- 'printer-restarted'
- 'printer-shutdown'
- ‘printer-config-changed’
- ‘printer-media-changed’
- ‘printer-finishings-changed’
- ‘printer-queue-order-changed’
- ‘printer-full’
- ‘printer-no-longer-full’
- ‘printer-almost-idle’
- ‘printer-not-almost-idle’

Standard Service event types generalized from [IPP-NOT] are:
- ‘service-state-changed’
- ‘service-restarted’
- ‘service-shutdown’
- ‘service-config-changed’
- ‘service-media-changed’
- ‘service-finishings-changed’
- ‘service-queue-order-changed’
- ‘service-full’
- ‘service-no-longer-full’
- ‘service-almost-idle’
- ‘service-not-almost-idle’
- and (optionally) vendor extension event types

Additional variable-bindings SHOULD be appended to this trap:
- Systems with the Host Resources MIB (RFC 2790) SHOULD add
  ‘hrSystemDate’
  (compare to IPP ‘printer-current-time’)

Additional variable-bindings MAY be appended to this trap for all printer-specific events:
- Systems with the Host Resources MIB (RFC 2790) MAY add
  ‘hrDeviceStatus’
  (compare to IPP ‘printer-state’)
  ‘hrPrinterStatus’
  (compare to IPP ‘printer-state’) and
  ‘hrPrinterDetectedErrorState’
  (compare to IPP ‘printer-state-reasons’)

Systems MAY add other variable-bindings from any MIB.

See:  Section 5.3.2 ‘notify-events’ in [IPP-NOT];
       Section 8.1 ‘notify-subscribed-event’ in [IPP-NOT];
       Section 9 ‘Event Notification Content’ in [IPP-NOT]."

::= { jmServiceBasicV2EventPrefix 1 }

4.1.2. Job Basic Event - Trap

-- Job Basic Event Group (CONDITIONALLY MANDATORY) --
Implementation of this group is conditionally mandatory;
mandatory for systems which send this Job traps via SNMP.

The jmJobBasicEventGroup consists entirely of the
jmJobBasicV2Event notification.

jmJobBasicV1Enterprise OBJECT-IDENTITY
   STATUS current
   DESCRIPTION
   "The value of the enterprise-specific OID in an SNMPv1 trap
   for a Job basic event sent by this managed system."
   ::= { jobmonMIBNotifications 2 }

jmJobBasicV2EventPrefix
   OBJECT IDENTIFIER ::= { jmJobBasicV1Enterprise 0 }

jmJobBasicV2Event NOTIFICATION-TYPE
   OBJECTS {
      jmJobEventNotifyEvent,  
      jmJobState,  
      jmJobEventJobStateReasons 
   }
   STATUS current
   DESCRIPTION
   "This SMIv2 trap corresponds to an IPP Job basic event.

   The values of 'jmGeneralJobSetIndex' and 'jmJobIndex' for
   use with 'jmJobTable' for this Job are conveyed in the
   instance qualifier (OID suffix) of 'jmJobState'.

   This trap is sent when requested by a prior subscription.
   The subscribed event type is in 'jmJobEventNotifyEvent'.

   Event types reported via 'jmJobBasicV2Event' include:
   - 'job-state-changed'
   - 'job-created'
   - 'job-completed'
   - 'job-purged'
   - 'job-config-changed'
   - and (optionally) vendor extension event types

   Additional variable-bindings SHOULD be appended to this trap:
   - Systems with the Host Resources MIB (RFC 2790) SHOULD add
     'hrSystemDate'
     (compare to IPP 'printer-current-time')

   Systems MAY add other variable-bindings from any MIB.

See: Section 5.3.2 'notify-events' in [IPP-NOT];
     Section 8.1 'notify-subscribed-event' in [IPP-NOT];
     Section 9 'Event Notification Content' in [IPP-NOT]."
4.1.3. Job Completed Event – Trap

--- Job Completed Event Group (CONDITIONALLY MANDATORY)
--- Implementation of this group is conditionally mandatory;
--- mandatory for systems which send this Job traps via SNMP.

jmJobCompletedV1Enterprise OBJECT-IDENTITY
   STATUS current
   DESCRIPTION "The value of the enterprise-specific OID in an SNMPv1 trap for a Job completed event sent by this managed system."
   ::= { jobmonMIBNotifications 3 }

jmJobCompletedV2EventPrefix
   OBJECT IDENTIFIER ::= { jmJobCompletedV1Enterprise 0 }

jmJobCompletedV2Event NOTIFICATION-TYPE
   OBJECTS {
      jmJobEventNotifyEvent,
      jmJobState,
      jmJobEventJobStateReasons,
      jmJobKOctetsProcessed,
      jmJobImpressionsCompleted
   }
   STATUS current
   DESCRIPTION "This SMIv2 trap corresponds to an IPP 'job-completed' event. The values of 'jmGeneralJobSetIndex' and 'jmJobIndex' for use with 'jmJobTable' for this Job are conveyed in the instance qualifier (OID suffix) of 'jmJobState'.

   This trap is sent when requested by a prior subscription. The subscribed event type is in 'jmJobEventNotifyEvent'.

   Event types reported via 'jmJobCompletedV2Event' include:
   - 'job-completed'
   - 'job-purged'
   - and (optionally) vendor extension event types

   Additional variable-bindings SHOULD be appended to this trap:
   - Systems with the Host Resources MIB (RFC 2790) SHOULD add 'hrSystemDate' (compare to IPP 'printer-current-time')

   Systems MAY add other variable-bindings from any MIB.

Hastings, McDonald           Expires 6 January 2001            [Page 11]
4.1.4. Job Progress Event - Trap

-- Job Progress Event Group (CONDITIONALLY MANDATORY)
--
-- Implementation of this group is conditionally mandatory;
-- mandatory for systems which send this Job traps via SNMP.

jmJobProgressV1Enterprise OBJECT-IDENTITY
  STATUS current
  DESCRIPTION "The value of the enterprise-specific OID in an SNMPv1 trap for a Job progress event sent by this managed system."
  ::= { jobmonMIBNotifications 4 }

jmJobProgressV2EventPrefix
  OBJECT IDENTIFIER ::= { jmJobProgressV1Enterprise 0 }

jmJobProgressV2Event NOTIFICATION-TYPE
  OBJECTS {
    jmJobKOctetsPerCopyRequested,
    jmJobKOctetsProcessed,
    jmJobImpressionsPerCopyRequested,
    jmJobImpressionsCompleted,
    jmProgressJobCopiesRequested,
    jmProgressJobCollationType,
    jmProgressMediaSheetsCompleted,
    jmProgressSheetCompletedCopyNum,
    jmProgressSheetCompletedDocNum
  }
  STATUS current
  DESCRIPTION "This SMIv2 trap corresponds to an IPP 'job-progress' event.

  The values of 'jmGeneralJobSetIndex' and 'jmJobIndex' for use with 'jmJobTable' for this Job are conveyed in the instance qualifier (OID suffix) of 'jmJobKOctetsProcessed'.

  This trap is sent when requested by a prior subscription. The event type is 'job-progress'.

  Additional variable-bindings SHOULD be appended to this trap:
  - Systems with the Host Resources MIB (RFC 2790) SHOULD add 'hrSystemDate'"
Systems MAY add other variable-bindings from any MIB.

See:  Section 5.3.2 'notify-events' in [IPP-NOT];
      Section 8.1 'notify-subscribed-event' in [IPP-NOT];
      Section 9 'Event Notification Content' in [IPP-NOT]."
::= { jmJobProgressV2EventPrefix 1 }

4.2.  Object Definitions

4.2.1.  Service Group - Objects

-- The Service Group (CONDITIONALLY MANDATORY)
-- Implementation of this group is conditionally mandatory;
-- mandatory for systems which show Service state via SNMP.

-- The jmServiceGroup consists entirely of the jmServiceTable

jmService  OBJECT IDENTIFIER ::= { jobmonMIBObjects 7 }

jmServiceTable  OBJECT-TYPE
SYNTAX  SEQUENCE OF JmServiceEntry
MAX-ACCESS  not-accessible
STATUS  current
DESCRIPTION
"The jmServiceTable consists of basic service state and status information for each service which offers one or more job services on this managed system.

An entry SHALL exist in this table for each service, no matter what the state of that service. A service MAY support multiple configured job sets and configured devices.

See:  'jmServiceJobSetsConfigured' and 'jmServiceDevicesConfigured' bit-arrays in this MIB."
::= { jmService 1 }

jmServiceEntry  OBJECT-TYPE
SYNTAX  JmServiceEntry
MAX-ACCESS  not-accessible
STATUS  current
DESCRIPTION
"Basic service state and status information."
INDEX  { jmServiceIndex }
::= { jmServiceTable 1 }

JmServiceEntry ::= SEQUENCE {
  jmServiceIndex                      Integer32 (1..2147483647),
  jmServiceName                       JmUTF8StringTC (SIZE (0..63)),
  jmServiceURI                        JmUTF8StringTC (SIZE (0..63)),
  jmServiceJobServiceTypes            JmJobServiceTypesTC,
  jmServiceJobSetsConfigured          OCTET STRING (SIZE (0..255)),
  jmServiceDevicesConfigured          OCTET STRING (SIZE (0..255)),
  jmServiceState                      JmServiceStateTC,
  jmServiceStateReasons               SnmpAdminString (SIZE (0..255))
}

jmServiceIndex OBJECT-TYPE
SYNTAX     Integer32 (1..2147483647)
MAX-ACCESS not-accessible
STATUS      current
DESCRIPTION
"The unique identifier for this service on this managed system.

See:    ‘jmServiceEventManagerIndex’ object in this MIB."
 ::= { jmServiceEntry 1 }

jmServiceName OBJECT-TYPE
SYNTAX     JmUTF8StringTC (SIZE(0..63))    -- 127 in IPP
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
"The human readable name of this managed service.

See:    ‘deviceNameRequested’ job attribute in this MIB;
        ‘physicalDevice’ job attribute in this MIB;
        Section 4.4.4 ‘printer-name’ in [IPP-MOD]."
DEFVAL      { "H" }                 -- no service name
 ::= { jmServiceEntry 2 }

jmServiceURI OBJECT-TYPE
SYNTAX     JmUTF8StringTC (SIZE(0..63))    -- 1023 in IPP
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
"A URI for this managed service (valid for job services).

See:    Section 4.3.3 ‘job-printer-uri’ in [IPP-MOD];
        Section 4.4.1 ‘printer-uri-supported’ in [IPP-MOD]."
DEFVAL      { "H" }                 -- no service URI
 ::= { jmServiceEntry 3 }

jmServiceJobServiceTypes OBJECT-TYPE
SYNTAX     JmJobServiceTypesTC

Hastings, McDonald           Expires 6 January 2001            [Page 14]
DESCRIPTION
"The types of job services supported by this managed service.

See: 'JmJobServiceTypesTC' textual convention in this MIB;
     'jobServiceTypes' job attribute in this MIB.

DEFVAL { 0 }                   -- no job services
::= { jmServiceEntry 4 }

jmServiceJobSetsConfigured OBJECT-TYPE
SYNTAX    OCTET STRING (SIZE(0..255))
MAX-ACCESS read-only
STATUS    current
DESCRIPTION
"A bit-array that specifies the job sets configured for this
service, where each bit ‘2**n’ is set if ‘jmGeneralJobSetIndex’
is a configured job set. Uses network byte order (big-endian)
rules - the high-order bit of the first octet corresponds to
‘jmGeneralJobSetIndex’ of ‘0’ (reserved) - the low-order bit of
the first octet corresponds to ‘jmGeneralJobSetIndex’ of ‘7’.
Supports values of ‘jmGeneralJobSetIndex’ from ‘1’ to ‘2039’.

Compare to the BITS pseudotype defined in IETF SMIV2 (RFC 2578)
which has the same bit ordering rules (big-endian).

See: 'queueNameRequested’ job attribute in this MIB;
     'jmGeneralJobSetIndex’ table index in this MIB.

DEFVAL { 'H' }                 -- no job sets configured
::= { jmServiceEntry 5 }

jmServiceDevicesConfigured OBJECT-TYPE
SYNTAX    OCTET STRING (SIZE(0..255))
MAX-ACCESS read-only
STATUS    current
DESCRIPTION
"A bit-array that specifies the devices configured for this
service, where each bit ‘2**n’ is set if ‘hrDeviceIndex’
is a configured device. Uses network byte order (big-endian)
rules - the high-order bit of the first octet corresponds to
‘hrDeviceIndex’ of ‘0’ (reserved) - the low-order bit of
the first octet corresponds to ‘hrDeviceIndex’ of ‘7’.
Supports values of ‘hrDeviceIndex’ from ‘1’ to ‘2039’.

Compare to the BITS pseudotype defined in IETF SMIV2 (RFC 2578)
which has the same bit ordering rules (big-endian).

See: 'physicalDevice’ job attribute in this MIB;
     'hrDeviceIndex’ in IETF Host MIB (RFC 2790).

DEFVAL { 'H' }                 -- no devices configured
::= { jmServiceEntry 6 }
jmServiceState OBJECT-TYPE
SYNTAX JmServiceStateTC
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The current state of this managed service.
See: 'jmServiceEventServiceState' object in this MIB;
     'jmJobState' object in this MIB;
     Section 4.4.11 'printer-state' in [IPP-MOD]."
DEFVAL { unknown }             -- unknown service state
 ::= { jmServiceEntry 7 }

jmServiceStateReasons OBJECT-TYPE
SYNTAX SnmpAdminString (SIZE (0..255)) -- multi-valued in IPP
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The service state reasons associated with this service state
(as a comma-separated list) or the empty string (if none).
See: 'jmServiceEventServiceStateReasons' object in this MIB;
     'jmJobStateReasons1' object in this MIB;
     Section 4.4.12 'printer-state-reasons' in [IPP-MOD]."
DEFVAL { '' }                 -- no service state reasons
 ::= { jmServiceEntry 8 }

4.2.2. Service Event Group - Objects

-- The Service Event Group (CONDITIONALLY MANDATORY)
-- Implementation of this group is conditionally mandatory;
-- mandatory for systems which show Service events via SNMP.
-- The jmServiceEventGroup consists entirely of the jmServiceEventTable

jmServiceEvent OBJECT IDENTIFIER ::= { jobmonMIBObjects 8 }

jmServiceEventTable OBJECT-TYPE
SYNTAX SEQUENCE OF JmServiceEventEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The jmServiceEventTable contains service event entries for the
services which offer job services on this managed system."
 ::= { jmServiceEvent 1 }
jmServiceEventEntry  OBJECT-TYPE
SYNTAX      JmServiceEventEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION  "Basic service event information."
INDEX  { jmServiceEventIndex }
 ::=  { jmServiceEventTable 1 }

jmServiceEventEntry ::= SEQUENCE {
  jmServiceEventIndex                 Integer32 (1..2147483647),
  jmServiceEventNotifyEvent           SnmpAdminString (SIZE (0..63)),
  jmServiceEventNotifyTime            TimeTicks,
  jmServiceEventServiceIndex          Integer32 (1..2147483647),
  jmServiceEventServiceState          JmServiceStateTC,
  jmServiceEventServiceStateReasons   SnmpAdminString (SIZE (0..255))
}

jmServiceEventIndex  OBJECT-TYPE
SYNTAX      Integer32 (1..2147483647)
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION  "The unique identifier for this event on this managed system."
 ::=  { jmServiceEventEntry 1 }

jmServiceEventNotifyEvent  OBJECT-TYPE
SYNTAX      SnmpAdminString (SIZE (0..63))   -- 255 in [IPP-NOT]
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION  "The event type that created this row in 'jmServiceEventTable'."

  Standard Printer event types defined in [IPP-NOT] are:
  - 'printer-state-changed'
  - 'printer-restarted'
  - 'printer-shutdown'
  - 'printer-config-changed'
  - 'printer-media-changed'
  - 'printer-finishings-changed'
  - 'printer-queue-order-changed'
  - 'printer-full'
  - 'printer-no-longer-full'
  - 'printer-almost-idle'
  - 'printer-not-almost-idle'

  Standard Service event types generalized from [IPP-NOT] are:
  - 'service-state-changed'
  - 'service-restarted'
- `service-shutdown`
- `service-config-changed`
- `service-media-changed`
- `service-finishings-changed`
- `service-queue-order-changed`
- `service-full`
- `service-no-longer-full`
- `service-almost-idle`
- `service-not-almost-idle`

Conformance: The natural language for keywords in subscribed event type SHALL always be US English.

Conformance: This subscribed event type SHALL be valid and reported in ALL Job Monitoring MIB notifications.

See: Section 8.1 'notify-subscribed-event' in [IPP-NOT]."

DEFVAL { ''H } -- no notify subscribed event
::= { jmServiceEventEntry 2 }

jmServiceEventNotifyTime OBJECT-TYPE
SYNTAX TimeTicks
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The time of this service event.

Usage: Conforming management agents, which MUST implement the IETF MIB-II (RFC 1213), SHALL set 'jmServiceEventNotifyTime' to 'sysUpTime' when a service event row is created.

See: 'sysUpTime' in IETF MIB-II (RFC 1213);
Section 5.4.4 'notify-printer-up-time' in [IPP-NOT];
Section 4.4.29 'printer-up-time' in [IPP-MOD]."
::= { jmServiceEventEntry 3 }

jmServiceEventServiceIndex OBJECT-TYPE
SYNTAX Integer32 (1..2147483647)
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The unique identifier for this service on this managed system.

See: 'jmServiceIndex' object in this MIB."
::= { jmServiceEventEntry 4 }

jmServiceEventServiceState OBJECT-TYPE
SYNTAX JmServiceStateTC
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The state of this managed service at the time of this event.

See: ‘jmServiceState’ object in this MIB;
     ‘jmJobState’ object in this MIB;
     Section 4.4.11 ‘printer-state’ in [IPP-MOD]."
DEFVAL { unknown }             -- unknown service state
::= { jmServiceEventEntry 5 }

jmServiceEventServiceStateReasons OBJECT-TYPE
SYNTAX      SnmpAdminString (SIZE (0..255)) -- multi-valued in IPP
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
"The service state reasons associated with this service state
(as a comma-separated list) or the empty string (if none).

See: ‘jmServiceStateReasons’ object in this MIB;
     ‘jmJobStateReasons1’ object in this MIB;
     Section 4.4.12 ‘printer-state-reasons’ in [IPP-MOD]."
DEFVAL      { ''H }                 -- no service state reasons
::= { jmServiceEventEntry 6 }

4.2.3.  Job Event Group - Objects

-- The Job Event Group (CONDITIONALLY MANDATORY)
--
-- Implementation of this group is conditionally mandatory;
-- mandatory for systems which show Job events via SNMP.
-- The jmJobEventGroup consists entirely of the jmJobEventTable

jmJobEvent  OBJECT IDENTIFIER ::= { jobmonMIBObjects 9 }

jmJobEventTable  OBJECT-TYPE
SYNTAX      SEQUENCE OF JmJobEventEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
"The jmJobEventTable contains job event entries for the
jobs present on this managed system."
::= { jmJobEvent 1 }

jmJobEventEntry  OBJECT-TYPE
SYNTAX      JmJobEventEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
"Basic job event information."
INDEX  { jmJobEventIndex } ::= { jmJobEventTable 1 }

JmJobEventEntry ::= SEQUENCE {
   jmJobEventIndex                     Integer32 (1..2147483647),
   jmJobEventNotifyEvent               SnmpAdminString (SIZE (0..63)),
   jmJobEventNotifyTime                TimeTicks,
   jmJobEventJobSetIndex               Integer32 (1..32767),
   jmJobEventJobIndex                  Integer32 (1..2147483647),
   jmJobEventJobState                  JmJobStateTC,
   jmJobEventJobStateReasons           OCTET STRING (SIZE (4..16))
}

jmJobEventIndex OBJECT-TYPE
SYNTAX      Integer32 (1..2147483647)
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION  "The unique identifier for this event on this managed system."
 ::= { jmJobEventEntry 1 }

jmJobEventNotifyEvent OBJECT-TYPE
SYNTAX      SnmpAdminString (SIZE (0..63))   -- 255 in [IPP-NOT]
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION  "The event type that created this row in 'jmJobEventTable'.

Standard Job event types defined in [IPP-NOT] are:
- 'job-state-changed'
- 'job-created'
- 'job-completed'
- 'job-purged'
- 'job-config-changed'
- 'job-progress'

Conformance: The natural language for keywords in subscribed event type SHALL always be US English.

Conformance: This subscribed event type SHALL be valid and reported in ALL Job Monitoring MIB notifications.

   See: Section 8.1 'notify-subscribed-event’ in [IPP-NOT]."
DEFVAL      { ''H }                 -- no notify subscribed event
 ::= { jmJobEventEntry 2 }

jmJobEventNotifyTime OBJECT-TYPE
SYNTAX      TimeTicks
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
"The time of this job event.

Usage: Conforming management agents, which MUST implement the
IETF MIB-II (RFC 1213), SHALL set 'jmJobEventNotifyTime' to
'sysUpTime' when a job event row is created.

See: 'sysUpTime' in IETF MIB-II (RFC 1213);
Section 5.4.4 'notify-printer-up-time' in [IPP-NOT];
Section 4.4.29 'printer-up-time' in [IPP-MOD]."

::= { jmJobEventEntry 3 }

jmJobEventJobSetIndex OBJECT-TYPE
SYNTAX Integer32 (1..32767)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The unique identifier for this job set on this managed system.

See: 'jmGeneralJobSetIndex' object in this MIB."
::= { jmJobEventEntry 4 }

jmJobEventJobIndex OBJECT-TYPE
SYNTAX Integer32 (1..2147483647)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The unique identifier for this job on this managed system,
when prefixed with 'jmJobEventJobSetIndex'.

See: 'jmJobIndex' object in this MIB."
::= { jmJobEventEntry 5 }

jmJobEventJobState OBJECT-TYPE
SYNTAX JmJobStateTC
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The state of this managed job at the time of this event.

See: 'jmJobState' in this MIB;
Section 4.3.7 'job-state' in [IPP-MOD]."
DEFVAL { unknown } -- unknown job state
::= { jmJobEventEntry 6 }

jmJobEventJobStateReasons OBJECT-TYPE
SYNTAX OCTET STRING (SIZE (4..16)) -- multi-valued in IPP
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The job state reasons associated with this job state
represented as one to four concatenated 32-bit integers in network byte order (big-endian).

Usage: Conforming management stations SHALL always report the value of the object ‘jmJobStateReasons1’ in the first four octets of ‘jmJobEventJobStateReasons’ and SHOULD report values of the attributes ‘jobStateReasons2’, ‘jobStateReasons3’, and ‘jobStateReasons4’ in subsequent octets.

See: ‘jmJobStateReasons1’ in this MIB; Section 4.3.8 ‘job-state-reasons’ in [IPP-MOD]."

DEFVAL { '00000000'H } -- no job state reasons
::= { jmJobEventEntry 7 }

4.2.4. Job Progress Group - Objects

-- The Job Progress Group (CONDITIONALLY MANDATORY)
-- Implementation of this group is conditionally mandatory;
-- mandatory for systems which send Job progress traps via SNMP.

-- The jmProgressGroup consists entirely of leaf objects for traps

jmProgress OBJECT IDENTIFIER ::= { jobmonMIBObjects 10 }

jmProgressJobCopiesRequested OBJECT-TYPE
SYNTAX Integer32 (-2..2147483647)
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of copies of this job requested by the client.

See: ‘jobCopiesRequested’ attribute in this MIB."

DEFVAL { -2 } -- unknown job copies
::= { jmProgress 1 }

jmProgressJobCollationType OBJECT-TYPE
SYNTAX JmJobCollationTypeTC
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of copies of this job requested by the client.

See: ‘jobCollationType’ attribute in this MIB;
‘job-collation-type’ in [IPP-PROG];
Section 9 ‘Event Notification Content’ in [IPP-NOT]."

DEFVAL { unknown } -- unknown job collation type
::= { jmProgress 2 }
jmProgressMediaSheetsCompleted OBJECT-TYPE
SYNTAX Integer32 (-2..2147483647)
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of media sheets completed for this job.
See: 'sheetsCompleted' attribute in this MIB;
    Section 4.3.18.3 'job-media-sheets-completed'
    in [IPP-MOD];
    Section 9 'Event Notification Content' in [IPP-NOT]."
DEFVAL { -2 } -- unknown job progress
 ::= { jmProgress 3 }

jmProgressSheetCompletedCopyNum OBJECT-TYPE
SYNTAX Integer32 (-2..2147483647)
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of the job copy currently being stacked for the
current document or zero (if none) or '-2' (unknown).
See: 'sheetCompletedCopyNumber' attribute in this MIB;
    'sheet-completed-copy-number' in [IPP-PROG];
    Section 9 'Event Notification Content' in [IPP-NOT]."
DEFVAL { -2 } -- unknown sheet complete copy
 ::= { jmProgress 4 }

jmProgressSheetCompletedDocNum OBJECT-TYPE
SYNTAX Integer32 (-2..2147483647)
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of the job document currently being stacked for the
current job or zero (if none) or '-2' (unknown).
See: 'sheetCompletedDocumentNumber' attribute in this MIB;
    'sheet-completed-document-number' in [IPP-PROG];
    Section 9 'Event Notification Content' in [IPP-NOT]."
DEFVAL { -2 } -- unknown sheet complete doc
 ::= { jmProgress 5 }
5. IANA Considerations

None.

6. Internationalization Considerations


7. Security Considerations

This IPP Notifications over SNMP mapping defines only ‘read-only’ objects. It is suitable for use with any version of SNMP, as no update security is required (because no configuration updates are supported).

No sensitive information is available via IPP Notifications over SNMP.
8. References


9. Change Log

Changes in reverse chronological order (most recent first).

<draft-ietf-ipp-not-over-snmp-03.txt> - 6 July 2000
1) Added 'SnmpAdminString' to IMPORTS clause for new objects.
2) Corrected OID in MODULE-IDENTITY to use forward reference to
definition of 'pwg' from 'enterprises' and 'mibs' from 'pwg'.
3) Added 'JmServiceStateTC' textual convention.
4) Added 'jmMirrorAttr' and 'jmSystem' object identifiers reserved
   for future extensions.
5) Major rewrite, per email discussion on IETF IPP WG list, to
   specify four new small (traditional) SNMP traps for:
   'jmServiceBasicV2Event' (generalized from IPP Printer event),
   'jmJobBasicV2Event' (corresponds IPP Job event),
   'jmJobCompletedV2Event' (corresponds IPP Job completed event),
   'jmJobProgressV2Event' (corresponds IPP Job progress event).
6) Major rewrite, per email discussion on IETF IPP WG list, to
   specify four new SNMP object groups:  'jmServiceTable' (name,
   URI, state, etc. - from IPP Printer), 'jmServiceEventTable'
   (records IPP Printer events for polling), 'jmJobTable'
   (records IPP Job events for polling), 'jmJobProgressGroup' (leaf
   objects for IPP Job progress event).
7) Revised section 3.1 'SNMP Mapping for IPP Printer Events' and
   section 3.2 'SNMP Mapping for IPP Job Events', to agree with
   above.
8) Deleted obsolete section 3.3 'Rules for Encoding Notifications',
   as event bindings now always fit over all SNMP transport
   protocols.

<draft-ietf-ipp-not-over-snmp-02.txt> - 19 March 2000
1) Renamed Printer Event notification group to Device Basic Event
   and 'jmPrinterEventV2Event' notification to
   'jmDeviceBasicV2Event', to better align with IPP and to support
   non-printing jobs.
2) Revised 'jmDeviceBasicV2Event' notification to remove
   'hrDeviceStatus', 'hrPrinterStatus',
   'hrPrinterDetectedErrorState' from mandatory trap bindings
   because they were redundant, per request of Ron Bergman.
3) Renamed Job Event notification group to Job Basic Event and
   'jmJobEventV2Event' notification to 'jmJobBasicV2Event', to
   better align with IPP and to support variant job events.
4) Defined new Job Completed Event notification group and defined
   new Job Progress Event notification group, to better align with
   IPP and to support variant job events.
5) Renamed Event object group to Event Binding,
   'jmEventPrinterState' to 'jmEventDeviceState',
   'jmEventPrinterStateReasons' to 'jmEventDeviceStateReasons',
   'jmEventPrinterIsAcceptingJobs' to
6) Revised Event Binding object group, adding explicit objects
   ‘jmEventDeviceIsAcceptingJobs’, to support non-printing jobs.

6) Revised SYNTAX of ‘jmEventTriggerEvent’ object from
   ‘JmUTF8StringTC’ (string) to IPP-aligned enumeration, per request of Ron Bergman.

7) Removed all references to Printer MIB v2, as they were of limited
   value, per request of Ron Bergman.

8) Revised ‘SNMP Mapping for IPP Printer Events’ section for renamed
   event binding objects, per request of Ron Bergman.

9) Revised ‘Rules for Encoding Notifications’ section to truncate
   additional string bindings, per request of Ron Bergman.

10) Revised ‘Registration via IPP’ section, to change scheme name
    from ‘ipp-snmp:’ to ‘snmpnotify:’, per request of Ron Bergman.

<draft-ietf-ipp-not-over-snmp-01.txt> - 1 December 1999

1) Deleted ‘JmTriggerEventTC’ textual convention (see below).

2) Revised SYNTAX of ‘jmEventTriggerEvent’ object from
   ‘JmTriggerEventTC’ (enumeration) to ‘JmUTF8StringTC’ (string), to
   support use of IPP standard keywords.

3) Added ‘jmEventPrinterState’, ‘jmEventPrinterStateReasons’, and
   ‘jmEventPrinterIsAcceptingJobs’ objects for consistency w/
   [IPP-NOT] and to reduce ambiguity about printer states inherent
   in RFC 1759.

4) Revised DESCRIPTION of ‘jmPrinterEventV2Event’ notification to
   add SHOULD (recommendation) for ‘jmEventPrinterState’,
   ‘jmEventPrinterStateReasons’, and ‘jmEventPrinterIsAcceptingJobs’
   objects.

5) Revised ‘SNMP Mapping for IPP Printer Events’ section to add
   direct mapping of IPP notification attributes to
   ‘jmEventPrinterState’, ‘jmEventPrinterStateReasons’, and
   ‘jmEventPrinterIsAcceptingJobs’ objects.

6) Revised ‘Rules for Encoding Notifications’ section to add
   ‘jmEventPrinterState’ and ‘jmEventPrinterStateReasons’.

7) Revised ‘IANA Considerations’ section to specify there are none –
   no enumerated or keyword textual conventions are now defined in
   this document.

8) Revised ‘Internationalization Considerations’ section to specify
   that US English keywords are used in ‘jmEventTriggerEvent’,
   ‘jmEventPrinterState’, and ‘jmEventPrinterStateReasons’ objects
   and thus no explicit natural language tagging is required.

<draft-ietf-ipp-not-over-snmp-00.txt> - 10 October 1999
1) Initial version.
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