PWG-DRAFT
draft-pwg-ipp-tipsi-mapping-01.pdf

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Internet Printing Protocol/1.0: IPP to IEEE 1284.1 Mapping

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This PWG-Draft expires on September 18, 1998.

Abstract

This document is a supplement to the set of documents which describes the Internet Printing Protocol (IPP). IPP is an application level protocol that can be used for distributed printing using Internet tools and technologies. This document details a means for an IPP Printer Object implemented on a general purpose computing platform (often called a server) to communicate with a printing device (often called a printer) over typically a TCP/IP connection using IEEE Standard 1284.1-1997 “Transport Independent Printer/System Interface.”

The full set of IPP documents are available from the PWG Web site and includes:

Requirements for an Internet Printing Protocol [IPP-REQ]
Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [IPP-RAT]
Internet Printing Protocol/1.0: Model and Semantics (this document)
Internet Printing Protocol/1.0: Protocol Specification [IPP-PRO]

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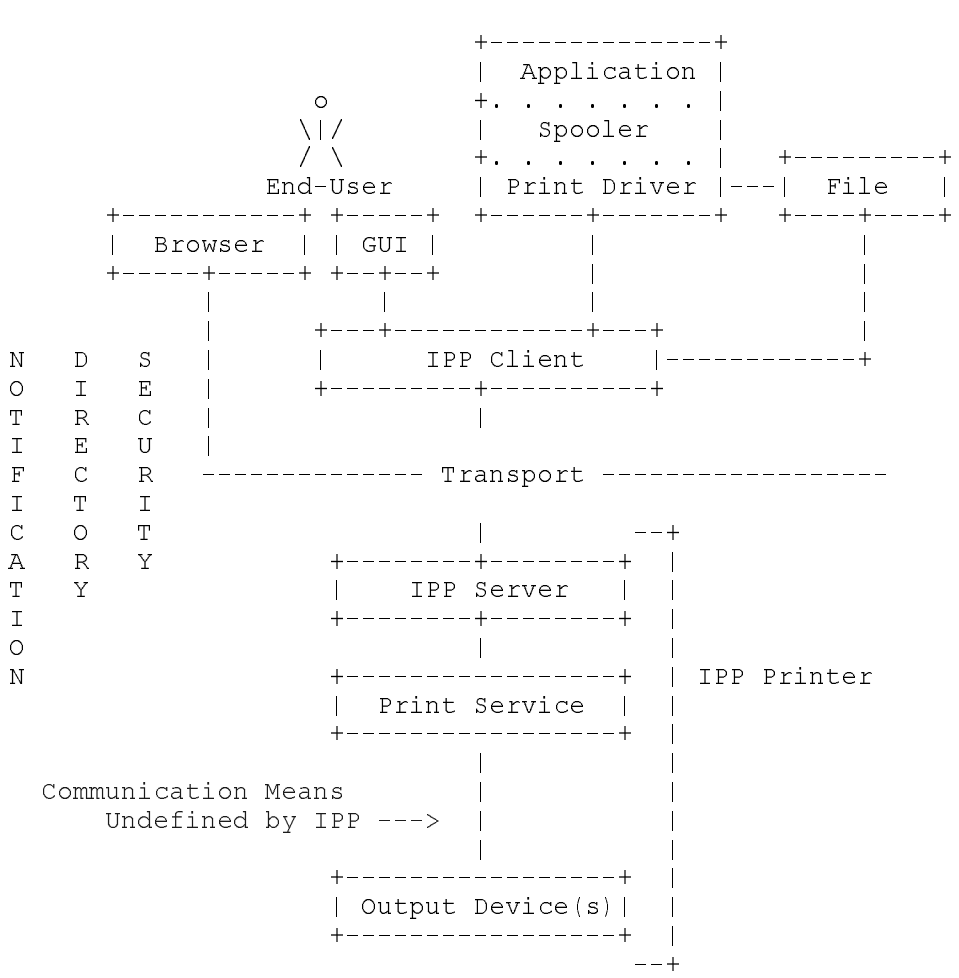
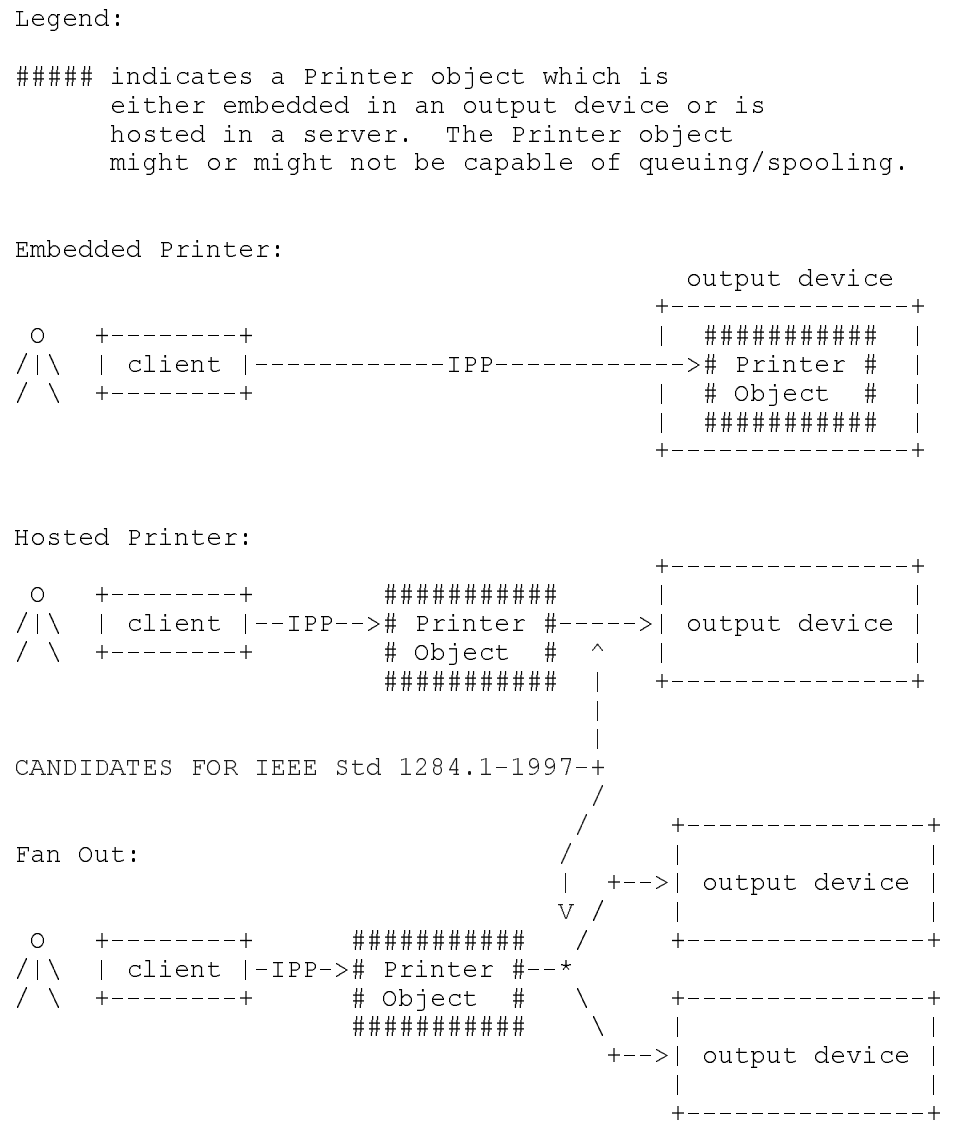
1. Introduction to IPP and TIP/SI

The Internet Printing Protocol (IPP) is an application level protocol that can provide distributed printing using Internet tools and technologies. IPP version 1.0 (IPP/1.0) focuses only on end user functionality. Anyone reading this document for the first time is strongly encouraged to read the IPP document set.

The IPP V1.0 model describes a print environment with only an IPP Client and an IPP Printer. It is important, however, to understand that in many real system implementations (which lie underneath the abstracted model), there are other components of a print service which are not explicitly defined in the IPP/1.0 model. The following figure illustrates where IPP/1.0 fits with respect to these other components. Note that in the figure, the communications means between the IPP Printer's Print Service and the actual output device is undefined. In some implementations, it is expected that the IPP Server, the Print Service, and the output device will be contained in one physical entity in which case the communications means among them is unimportant. In what is expected to be a common implementation, the IPP Server and the IPP Print Service are implemented on a general purpose computing platform and the output device is a separate device which marks on the media. In this case, there are many advantages to a standard communications means or protocol to be defined. IEEE Standard 1284.1-1997 defines a robust, general purpose protocol for communications between a "system" and a "printer." This document will describe the application of IEEE Std. 1284.1-1997 to the IPP environment.



An IPP Printer object is designed to encapsulate the functions normally associated with physical output devices along with the spooling, scheduling and multiple device management functions often associated with a print server. When this system is implemented as separate devices, e.g. a server and a printer, the server must know the state, capabilities and status of the output device. For the server to remain synchronized with multiple printers, a non-polling, alert driven communications means is needed. IEEE Std 1284.1-1997 provides this means. The next figure, shows the possible configurations of an IPP Printer. The “Hosted Printer” and “Fan-Out” examples, are prime candidates for using IEEE Std 1284.1-1997.



IPP clients implement the IPP protocol on the client side, and give end users (or programs running on behalf of end users) the ability to query Printer objects and submit and manage print jobs. An IPP server is just that part of the Printer object that implements the server-side protocol. The rest of the Printer object implements (or gateways into) the application semantics of the print service itself. The Printer objects may be embedded in an output device or may be implemented on a host on the network that communicates with the output device.

When a job is submitted to the Printer object and the Printer object validates the attributes in the submission request, the Printer object creates a new Job object. The end user then interacts with this new Job object to query its status and monitor the progress of the job. End users may also cancel the print job

by using the Job object's Cancel-Job operation. The notification service(s) are out of scope for IPP/1.0, but using such a notification service, the end user is able to register for and receive Printer specific and Job specific events. An end user can query the status of Printer objects and can follow the progress of Job objects by polling using the Get-Printer-Attributes, Get-Jobs, and Get-Job-Attributes operations.

2. Overview Of IEEE Std 1284.1-1997 (TIP/SI)

In the model used by TIP/SI, a printer is abstracted into a minimum of three logical entities: The Print Engine, Printer Interface Control Unit (PICU), and one or more logical units (LU's) (at least one of which is an interpreter). It is important to note that while an interpreter is a LU the converse is not always true. A LU can be another logically separate device or functionality in the printer such as a facsimile engine or document scanner.

While, the management of print document production and printing is complex, the task can be divided into two overlapping pieces, the management of printing and the management of the printer. Printing encompasses the entire process of producing a printed document: generation of the file to be printed, selection of a printer, choosing printing properties, routing, queuing, resource management, scheduling, and final printing including notification of the user. TIP/SI defines printer status, configuration and control objects and enables communications of those object that, when used by applications, greatly enhances both the management of printing and the management of the printer.

Because the work on the TIP/SI standard largely preceded the development of the IETF Print MIB (RFC1759), TIP/SI commands have been defined that allow the manipulation of manageable objects that are contained in a printer and are capable of being referenced using an OID including those print objects defined in the IETF Printer MIB. Job delivery was outside the scope of RFC1759 as it only covers the management of the printer itself. Because the MIB oriented commands were structured generically, access to any MIB objects within the printer, including those that were defined after TIP/SI, is still supported.

The function of the TIP/SI standard is to define a protocol that provides a means of returning configuration and status information in a manner that is independent of the printer's physical connection, imaging technology, or embodied LU(s). and to deliver print tasks to the printer synchronized with command and control information. In the TIP/SI model, the printer is intended to be managed by some intermediate system element external to the printer often, but not exclusively, a print server implemented on a general purpose computing platform.

The protocol provides a method for:

- retrieving traditionally static information such as the number and type of paper input and output trays, imaging resolution and speed, interpreter capabilities and their relationship to the print mechanism, etc.
- returning real-time status information related to the print mechanism that is independent of the LUs such as paper and printing supplies levels.

- a separate, logical, out of band communication channel for exchanging commands and responses. This out of band channel is key to the effective management of the printer while page processing is being done.
- selection or activation of a LU via host control.
- Delivery of print tasks of jobs while providing job separation.
- reporting job statistics independent of the LU.

The TIP/SI protocol has been designed to be link independent. The only requirement is that the link must be capable of bi-directional data transmission. Numerous methods and media exist today to facilitate this transport of information. Included are various LAN protocols (802.2, TCP/IP, etc.), asynchronous serial communications, and more recently the bi-directional parallel port defined by IEEE Std 1284-1994, "Standard Signaling Method for Bi-directional Parallel Peripheral Interface for Personal Computers."

3. Comparison of IPP and TIP/SI Print Models

3.1 Job Model Comparison

At a high level the print job model of IPP and TIP/SI are similar. Both support a two level task model. IPP calls these levels "Job" and "Document" while TIP/SI refers to them as "Session" and "Job" In IPP, a "job" consists of 1 or more "document" either explicitly delineated or implicitly assumed. Likewise, the TIP/SI "session" consists of one or more "jobs" either explicitly delineated or implicitly assumed.

Also consistently between IPP and TIP/SI, when an IPP Job or a TIP/SI session is started, the printer returns a printer unique identifier. Unlike IPP, TIP/SI also provides a printer unique identifier for each TIP/SI job which IPP does not provide for each IPP document.

3.2 IPP Job Submission Operations

There are several IPP Operations defined to cause print output to be created. The TIP/SI model is designed for a "server" to "printer" environment. It is expected in this configuration that IPP Operations such as Print-URI and Send-URI will be handled by the "server" and hence are not needed in communication between the server and the printer. In summary:

IPP Operation	**TIP/SI Operation**	**Comment**
Print-Job	JC:SJ	Implied TIP/SI Session
Print-URI	JC:SJ	Server resolves URI
Validate-Job	n/a	
Create-Job	JC:SS	
Send-Document	JC:SJ	subsequent to JC-SS
Send-URI	JC:SJ	Server resolves URI Subsequent to JC-SS

At the completion of a TIP/SI Session or Job, an explicit End-Session or End-Job is expected. Closing the connection between the server and the printer causes an implicit End-Session and End-Job if appropriate.

3.3 IPP Job Query and Control Operations

TIP/SI supports a more robust set of Session/Job queries than IPP; however it does not report back job attributes except those that are useful for accounting. In summary:

IPP Operation	TIP/SI Operation	Comment
Get-Jobs	JC:QSQA	
Cancel-Job	JC:DS	
Get-Job-Attributes	JC: QSQA, JC:QJC	TIP/SI returns accounting and status information about each job within a session. It is the server's responsibility to aggregate accounting totals for all the jobs in a session according to administrative policy.
none	JC:CSP	Change Session Priority
none	JC:RSJ	Jobs that are held or suspended due to job submission controls may be resumed

4. IPP Printer Attributes Compared to TIP/SI Printer Status and Configuration

Because the TIP/SI printer is really a marking device and the IPP printer is an abstraction of the marking device and usually a server implemented in a general purpose computing platform, the IPP Printer Attributes are typically at a high level while the TIP/SI Status and Configuration more closely resembles the Printer MIB (RFC1759). In fact, all the Printer MIB objects are available through TIP/SI using the Printer Variable Commands (PVC).

Most of the important configuration and status attributes map very well between IPP and TIP/SI. Attributes associated with a URI; however, do not map. It is expected that URI related attributes will be handled by the server and returned to the client.

The following table summarizes the comparison of IPP Printer Attributes versus TIP/SI Printer Status and Configuration information:

IPP Printer Attribute	**TIP/SI Command to retrieve equivalent information**	**Comment**
printer-uri-supported	n/a	provided by server
uri-security-supported	n/a	provided by server
printer-name	PCC:RPI	Read Administratively Set Printer Name
printer-location	n/a	provided by server
printer-info	n/a	provided by server
printer-more-info	n/a	provided by server
print driver-installer	n/a	provided by server
printer-make-and-model	RDC:RS	TIP/SI provides product name, product revision and serial number
printer-more-info-manufacturer	n/a	
printer-state	RDS:RSS	
printer-state-reason	RDS	Various sub-commands are used to determine the reason after using the RDS:RSS command to retrieve the summary
printer-state-message	RDS	see “printer-state-reason”

IPP Printer Attribute	**TIP/SI Command to retrieve equivalent information**	**Comment**
operations-supported	n/a	Only Printer Variable Commands and Operator Panel Commands are optional.
charset-configured	RDC:RS	roughly equivalent
charset-supported	n/a	
natural-language-configured	n/a	
generated-natural-language-supported	RDC:RS	roughly equivalent
document-format-default	n/a	Server is expected to selected the correct interpreter or send the job to an “auto-sensing” interpreter. LU #0 is defined to be the printer’s default interpreter.
document-format-supported	RIC:SI	
printer-is-accepting-jobs	RDS:RSS	additional queries may be made to obtain more information about why jobs cannot be accepted
queued-job-count	JC:QQA	
printer-message-from-operator	n/a	
color-supported	RDC:RS	
reference-URI-schemes-supported	n/a	provided by server
pdl-override-supported	n/a	Not supported because existing interpreters do not support this. See section 7: “Operation of a TIP/SI IPP Interpreter” for IPP Interpreter proposed operation.
printer-up-time	PVC:GPV	retrieved from MIB
printer-current-time	n/a	
multiple-operation-time-out	n/a	
compression-supported	n/a	TIP/SI assumes this is interpreter specific
job-k-octets-supported	n/a	provided by server, not limitable in the printer
job-impression-supported	n/a	provided by server, not limitable in the printer
job-media-sheets-supported	n/a	provided by server based upon

IPP Printer Attribute	TIP/SI Command to retrieve equivalent information	Comment
		out-tray capacities and administratively set controls.

Note: Some of the character set and language attributes have analogs in the Printer MIB (RFC1759) which can also be useful and can be retrieved via TIP/SI.

5. IPP Job-Template Attributes and TIP/SI

Only IPP Job-Template attributes of the type xxx-supported have an analog in the TIP/SI environment. Additionally, some xxx-defaults have an analog in the MIB environment which can be retrieved and set using TIP/SI (assuming the manufacturer supports setting defaults through its MIB.) It is expected that the Job-Template attributes of the type xxx will be provided to a newly defined IPP Interpreter as discussed in section 7: "Operation of a TIP/SI IPP Interpreter".

Job-Template Attributes (supported)	**TIP/SI Command to retrieve equivalent information**	**Comment**
job-priority-supported	n/a	All printers must support range of 0 to 255
job-hold-until-supported	n/a	provided by server
job-sheets-supported	n/a	provided by server
multiple-documents-handling-supported	n/a	
copies-supported	n/a	
finishings-supported	RDC:ROC	finishings are available on an output by output basis
page-ranges-supported	n/a	
sides-supported	RDC:RS	
number-up-supported	n/a	
orientation-requested-supported	RDC:RIC	Size in feed and cross-feed directions and printable area is available.
media-supported	RDC:RIC	Only available media is returned
printer-resolution-supported	RIC:SI PVC:GPV	Interpreter specific resolution Marking Engine resolution from MIB
print-quality-supported	n/a	

Job-Template Attributes (default)	**TIP/SI Command to retrieve equivalent information**	**Comment**
job-priority-default	n/a	provided by server

Job-Template Attributes (default)	**TIP/SI Command to retrieve equivalent information**	**Comment**
job-hold-until-default	n/a	provided by server
job-sheets-default	n/a	
multiple-documents-handling-default	n/a	
copies-default	n/a	
finishings-default	PVC:GPV	MIB Output Objects (Only BURSTING, DECOLLATING and STACKING are supported by the MIB.)
page-ranges-default	n/a	
sides-default	PVC:GPV	MIB Media Path Objects
number-up-default	n/a	
orientation-requested-default	PVC:GPV	MIB Interpreter
media-default	PVC:GPV	MIB General and Input Objects
printer-resolution-default	PVC:GPV	MIB Marker Objects
print-quality-default	n/a	

6. IPP Job Description Attributes and TIP/SI

Job Description Attributes	TIP/SI Command to retrieve equivalent information	Comment
job-uri	n/a	provided by server
job-id	JC:SS	Start Session returns a printer unique job ID
job-printer-uri	n/a	provided by server
job-more-info	n/a	provided by server
job-name	n/a	server correlates job-name with printer supplied job id
job-originating-user-name	n/a	server correlates job-originating-user-name with printer supplied job ID
job-state	JC:QSQA, JC:QQA	TIP/SI reports state of sessions and jobs
job-state-reason	JC:QSQA, JC:QQA	TIP/SI reports state of sessions and jobs
job-state-message	n/a	
number-of-documents	JC:QQA	TIP/SI reports all queued jobs (same as IPP documents)
output-device-assigned	n/a	provided by server
time-at-creation	see time-at-processing	provided by server
time-at-processing	JC:QJC	TIP/SI reports processing time in seconds
time-at-completed	see time-at-processing	provided by server
number-of-intervening-jobs	JC:QQA, JC:QSQA	TIP/SI reports all sessions and jobs queued
job-message-from-operator	n/a	
job-k-octets	n/a	
job-impressions	n/a	
job-media-sheets	n/a	
job-k-octets-processed	n/a	
job-impression-completed	JC:QJC	TIP/SI reports impressions per input tray
job-media-sheets-completed	JC:QJC	TIP/SI reports sheets per input

Job Description Attributes	**TIP/SI Command to retrieve equivalent information**	**Comment**
		tray
attributes-charset	n/a	
attribute-natural-language	n/a	

7. Operation of a TIP/SI IPP Interpreter

7.1 TIP/SI Logical Units

The printer model defined by the TIP/SI standard is partially based on the concept of a "logical unit" or LU. Conceptually an LU can be a page description language interpreter or almost any other functional device. For example, a fax subsystem or a scanner can be a TIP/SI logical unit. While the concept of an LU is assumed by TIP/SI, the operation of the LU is not defined by the standard. For example, a PostScript or PCL interpreter would each be an LU but their behavior is not defined by TIP/SI.

When TIP/SI is used as the server-to-printer protocol for IPP, an IPP LU would be defined. This definition will remain outside the scope of TIP/SI but can be standardized by the PWG or some other standards body.

7.2 An IPP Logical Unit

To deliver an IPP print job to a TIP/SI printer, the following series of events is suggested:

1. A JC:SS command is sent to the printer with requested priority.
2. Printer responds with printer assigned session ID and printer assigned priority.
3. A JC:SJ command is sent to the printer providing:
   - ♦ LU number (the IPP LU)
   - ♦ Job Alerts and Job Processing flags
   - ♦ Separate Data Channel flag set
   - ♦ Name of the host
   - ♦ Name of the user
   - ♦ Name of the job
   - ♦ Additional information string.
4. Printer responds with printer assigned job ID and printer assigned data channel
5. Server writes to the IPP LU, on the control channel, the:
   - ♦ The IPP Operation Attributes
   - ♦ The IPP Job Template Attributes.
6. Printer acknowledges the attributes
7. Server writes to the IPP LU, on the data channel, the document content or PDL.
8. Printer acknowledges the data.
9. The server sends a JC:EJ command.
10. The printer acknowledges the command.

11. If this is a multi-document IPP job, the server and printer repeat steps 3 through 10.
12. A JC:ES command is sent.
13. The printer acknowledges.

Note that in the above scenario, IPP operation and job template attributes are sent to the printer with each IPP document (TIP/SI job). As it is currently defined, IPP does not allow different attributes for each document within a job. It is assumed that the IPP V1.0 server would send the same attributes to the printer for each document. Should IPP be enhanced in the future, different attributes could be sent with each IPP document without requiring a change to the IPP LU in the printer.

7.3 PDL-Override Support in an IPP LU

IPP defines a printer attribute called "pdl-override-supported." As such, there is a need for the server to know whether the IPP LU in the printer is capable of overriding the PDL with job-template attributes. The current TIP/SI standard does not define the usage of bits 6 and 7 in the Interpreter Features Summary byte returned by the printer in response to the RIC:SI command (See clause 5.3.2.3 of [TIP/SI]). The proposed addition to the definition of this byte to support "pdl-override-supported" is:

--- Bit 6 set indicates that this interpreter "attempts" to make the IPP attribute values take precedence over embedded instructions in the document data; however, there is no guarantee.

--- Bit 6 clear indicates that this interpreter does "not-attempt" to make the IPP attribute values take precedence over embedded instructions in the document data.

7.4 IPP Attribute Fidelity in an IPP LU

If the IPP client requests that an IPP job must be printed with absolute fidelity, i.e. do not print the job if it cannot be done exactly as requested, the IPP LU must be able to report to the server that the IPP job failed because of the "ipp-attribute-fidelity" operation attribute was true and fidelity could not be maintained. To support this, a new job completion code must be added. The new job completion code (x'FFFD') is added to [TIP/SI] clause 6.3.7.1 in table 185. The modified table would then be:

Job Completion Codes

Code	Description
0000	Job completed successfully
0001	Job terminated abnormally due to a time-out condition
0002 – FFFC	Reserved
FFFD	Job terminated, unable to maintain fidelity
FFFE	Job terminated abnormally but reason unknown.
FFFF	Job canceled

8. TIP/SI Alerts

8.1 Overview

In order for a server to stay properly synchronized with a printer, either a polling means or an alert (or interrupt) means must be employed. TIP/SI supports either model, although it is generally believed that an alert mechanism places lower overhead on the server and the network.

While RDS (Request Device Status) commands may be used at any time to extract the current printer status, the asynchronous DSA is used to alert the host to an immediate change. As defined by TIP/SI, a condition that causes a DSA is "edge triggered", that is a DSA is only sent the first time the condition occurs. If the condition continues to persist it is reported in status but does not cause additional DSA messages to be sent. For any alert condition that is not cleared by a RDS command, a DSA shall also be generated when the condition is cleared. The DSA that is generated when a condition is cleared shall have the bit set to zero for the category in which the alert condition existed unless other alert conditions are active in that category.

If a condition that would cause a DSA is active at the time that its DSA is armed using the PCC-SDSA command then a DSA shall be sent. The normal, power-on reset condition is that all conditions that cause DSA messages are disabled until explicitly enabled by the host or server except for the Power On Initialization Alert. The DSA with the Power On Initialization bit set shall automatically be generated when the printer has completed a power on initialization sequence or any other initialization similar to power on. The Power On Initialization bit in the DSA shall be cleared when a RDS-RSS response is returned to the host.

It is expected that when used with IPP, some alerts generated in the printer and reported to the server via TIP/SI would be reported to the client. Other alerts such as those identifying a need for service, loading of paper, etc. would be reported to an operator. The notification means (to the client or operator from the server) is outside the scope of this document.

8.2 Alert Categories

TIP/SI provides alerts for a number of conditions, including but not limited to:

8.2.1 Input

Those conditions in the printer where problems with the input of printing media can cause the printer to stop. These conditions can normally be remedied by a normal operator. An example of this would be a particular input tray is empty.

8.2.2 Output

Those conditions in the printer where problems with the output of printing media can cause the printer to stop. These conditions can be normally be remedied by a normal operator. An example of this would be a particular output tray is full..

8.2.3 Jam

Those conditions in the printer where normal conditions associated with the movement of printing media through the printer can cause it to stop. These conditions can be corrected by a normal operator. An example of this would be "jam at input tray".

8.2.4 Printing Supplies

Those conditions in the printer where normal conditions associated with printing supplies can cause it to stop. These conditions can be corrected by a normal operator. An example of this would be " out of Ink".

8.2.5 Interpreter Messages

Those conditions that change in the interpreter that cause a message to be sent from the printer to the host. For example, an interpreter may report that a requested font is not available and another has been substituted.

8.2.6 Job Control Alerts

A JCA is an asynchronous unsolicited message that can be sent from the printer to the host at any time to convey job control status within the printer. For example, a JCA can report the completion of each page.

Additionally, a End-of-Job accounting message is also sent upon completion of a job containing an accounting record

8.2.7 Common Printer MIB Alert

If so enable, alerts that would normally be sent via an SNMP trap may be routed to the TIP/SI protocol. These alerts are defined in the printer MIB [RFC1759]

8.2.8 Operator Panel Alerts

Events on the operator panel, the depressing of a key, the state change of a light or a change on the operator display will cause an alert.

8.2.9 Operator Intervention Required

Those conditions in the printer, other than input, output, jam or printing supplies, that can cause the printer to stop. These conditions can be corrected by a normal operator. An examples of this would be "Cover Open".

8.2.10 Warnings

Those conditions that are not critical to the immediate operation of the printer: Examples are:
1 - Paper Input Low
2 - Toner Low
3 - Output Bin Nearly Full.

8.2.11 Device Service Required

Those conditions that are critical to printer operation that a normal operator can not correct and requires technical service. Examples are:
1 - Laser Polygon Scanner inoperative
2 - High Fuser Temperature.

8.2.12 Configuration Change

Those conditions that are detected that change the current configuration of the printer. Examples are:
1 - Memory Board Failure resulting in reduced memory.
2 - Font Cartridge/Card has been removed.

9. Security Considerations

This document does not address security.

10. Internationalization

This document does not address internationalization. In most cases, TIP/SI returns information about configuration and status in a bit encoded format. Strings returned by the printer supplement this bit encoding and are encoded according to the character set and language available from the RDC:RS command. If this information is not in the language desired by a client upstream from the server, it must be internationalized by the server based upon the bit encoding.

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14. APPENDIX A: Terminology

This specification uses the terminology defined in this section.

14.1 TIP/SI Commands

IEEE Std. 1284.1-1994 defines a number of commands and response sequences. These commands are abbreviated in the standard in the form XXX:YYY where XXX is the command and YYY is the sub-command. The commands and responses are grouped into eight groups:

1. RDS – Request Device Characteristics
2. RIC – Request Interpreter Characteristic
3. PCC – Printer Configuration Control
4. RDS – Request Device Status
5. JC – Job Control
   - JC:SS – Job Control, Start Session
   - JC:ES – Job Control, End Session
   - JC:SJ – Job Control, Start Job
   - JC:EJ – Job Control, End Job
6. RLUC – Request Logical Unit Characteristics
7. PVC – Printer Variable Commands
8. ROP – Remote Operator Panel

14.2 Other TIP/SI Abbreviations

- DSA – Device Status Alert

See the standard for a complete list of the sub-commands.

15. APPENDIX B: Supported Media

TIP/SI separates medium size from medium characteristics. Medium characteristics supported are:

- Paper
- Envelope
- Transparency

The following table compares the IPP medium sizes supported to those supported by TIP/SI:

IPP Media Name	TIP/SI Media Name	Comments
iso-a0	iso-a0	
iso-a1	iso-a1	
iso-a2	iso-a2	
iso-a3	iso-a3	
iso-a4	iso-a4	
iso-a5	iso-a5	
iso-a6	iso-a6	
iso-a7	iso-a7	
iso-a8	iso-a8	
iso-a9	iso-a9	
iso-a10	iso-a10	
	iso-4a0	1682mm X 2378mm
	iso-2a0	1189mm X 1682mm
	iso-Ra0	860mm X 1220mm
	iso-Ra1	610mm X 860mm
	iso-Ra2	430mm X 610mm
	iso-SRa0	900mm X 1280mm
	iso-SRa1	640mm X 900mm
	iso-SRa2	450mm X 640mm
iso-b0	iso-b0	
iso-b1	iso-b1	
iso-b2	iso-b2	
iso-b3	iso-b3	
iso-b4	iso-b4	
iso-b5	iso-b5	
iso-b6	iso-b6	

iso-b7	iso-b7	
iso-b8	iso-b8	
iso-b9	iso-b9	
iso-b10	iso-b10	
na-letter	US-A	
na-legal	US-Legal	
executive	US-Executive	
folio		
invoice	US-1/2 Letter	
ledger	US-B	
quarto		
	iso-c0	917mm X 1297 mm
	iso-c1	648mm X 917 mm
	iso-c2	458mm X 648 mm
iso-c3	iso-c3	
iso-c4	iso-c4	
iso-c5	iso-c5	
iso-c6	iso-c6	
	iso-c7	81mm X 114 mm
	iso-c8	57mm X 81 mm
iso-b4-envelope	iso-b4-envelope	
iso-b5-envelope	iso-b5-envelope	
	iso-b6-envelope	125mm X 176 mm
	iso-b6/c4 envelope	125mm X 324 mm
iso-c3-envelope	iso-c3-envelope	
iso-c4-envelope	iso-c4-envelope	
iso-c5-envelope	iso-c5-envelope	
iso-c6-envelope	iso-c6-envelope	
	iso-c7/6 envelope	81mm X 162 mm
	iso-c7 envelope	81mm X 114 mm
iso-designated-long	iso-envelope-dl	
na-10x13-envelope		
na-9x12-envelope		
na-number-10-envelope	US-Envelope-10	
na-7x9-envelope		
na-9x11-envelope		
na-10x14-envelope		
na-number-9-envelope	US-Envelope-9	
na-6x9-envelope		

na-10x15-envelope		
monarch-envelope	US-Envelope-7-3/4	
jis-b0	jis-b0	
jis-b1	jis-b1	
jis-b2	jis-b2	
jis-b3	jis-b3	
jis-b4	jis-b4	
jis-b5	jis-b5	
jis-b6	jis-b6	
jis-b7	jis-b7	
jis-b8	jis-b8	
jis-b9	jis-b9	
jis-b10	jis-b10	

The following standard values are defined for input-trays (from ISO DPA and the Printer MIB):

'top': The top input tray in the printer.
'middle': The middle input tray in the printer.
'bottom': The bottom input tray in the printer.
'envelope': The envelope input tray in the printer.
'manual': The manual feed input tray in the printer.
'large-capacity': The large capacity input tray in the printer.
'main': The main input tray
'side': The side input tray