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Internet Printing Protocol/1.1: IPP URL Scheme <draft-ietf-ipp-url-scheme-05.txt>

Status of this Memo

Abstract

This memo defines the "ipp" URL (Uniform Resource Locator) scheme. This memo updates IPP/1.1: Encoding and Transport (RFC 2910), by expanding and clarifying Section 5 'IPP URL Scheme' of RFC 2910. An "ipp" URL is used to specify the network location of a print service that supports the IPP Protocol (RFC 2910), or of a network resource (for example, a print job) managed by such a print service.

Table of Contents

1. Introduction

This memo conforms to all of the requirements in Registration Procedures for URL Scheme Names [RFC2717]. This memo also follows all of the recommendations in Guidelines for new URL Schemes [RFC2718].

See section 1 'Introduction' of [RFC2911] and section 1 'Introduction' of [RFC3196] for overview information about IPP. See section 10 'Description of the Base IPP Documents of [RFC3196] for a full description of the IPP document set.

This memo updates IPP/1.1: Encoding and Transport (RFC 2910), by expanding and clarifying Section 5 'IPP URL Scheme' of RFC 2910, but does not define any new parameters or other new extensions to the syntax of IPP URLs.

The IPP URL scheme defined in this document is based on the ABNF for the HTTP URL scheme defined in HTTP [RFC2616], which in turn is derived from the URI Generic Syntax [RFC2396] and further updated for IPv6 by [RFC2732]. An IPP URL is transformed into an HTTP URL according to the rules specified in section 5 of IPP Protocol [RFC2910].

This document defines IPP URL scheme applicability, associated port (631), associated MIME type ("application/ipp"), character encoding, and syntax.

This document is laid out as follows:

- Section 2 defines the terminology used throughout the document.

- Section 3 supplies references to the IPP Printer and IPP Job object model defined in IPP Model [RFC2911].

- Section 4 specifies the IPP URL scheme.

- Section 5 specifies the conformance requirements for IPP Clients and IPP Printers that claim conformance to this document.

- Sections 6, 7, and 8 specify IANA, internationalization, and security considerations.

- Sections 9, 10, 11, 12, and 13 specify normative references, informative references, acknowledgements, authors' addresses, and full IETF copyright statement.

- Section 14 (Appendix A) is a completed registration template for the IPP URL Scheme (see section 6.0 of [RFC2717]).

[Ed Note: Section 15, which should be removed before publication as an RFC, contains a complete change history of this IPP URL document.]

2. Terminology

This specification document uses the terminology defined in this section.

2.1. Conformance Terminology

The uppercase terms "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT" "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119]. These terms are used to specify conformance requirements for all implementations (both print clients and print services) of this specification.

2.2. Model Terminology

See section 12.2 'Model Terminology' in IPP Model [RFC2911].

3. IPP Model for Printers and Jobs

See section 2 'IPP Objects', section 2.1 'Printer Object', and section 2.2 'Job Object' in [RFC2911] for a full description of the IPP object model and terminology.

In this document, "IPP Client" means the software (on some hardware platform) that submits, monitors, and/or manages print jobs via the IPP Protocol [RFC2910] to a print spooler, print gateway, or physical printing device.

In this document, "IPP Printer object" means the software (on some hardware platform) that receives print jobs and/or printer/job operations via the IPP Protocol [RFC2910] from an "IPP Client".

In this document, "IPP Printer" is a synonym for "IPP Printer object".

In this document, "IPP Job object" means the set of attributes and documents for one print job instantiated on an "IPP Printer".

In this document, "IPP Job" is a synonym for "IPP Job object".

In this document, "IPP URL" means a URL with the "ipp" scheme.

Note: In this document, "IPP URL" is a synonym for "ipp-URL" (in section 4 'IPP URL Scheme' of this document) and "ipp-URL" (in section 5 'IPP URL Scheme' of [RFC2910]).

4. IPP URL Scheme

4.1. IPP URL Scheme Applicability

The "ipp" URL scheme MUST only be used to specify absolute URLs (relative IPP URLs are not allowed) for IPP print services and their associated network resources. The "ipp" URL scheme MUST only be used to specify the use of the abstract protocol defined in IPP Model [RFC2911] over an HTTP [RFC2616] transport, as defined in IPP Protocol [RFC2910]. Any other transport binding for the abstract protocol defined in IPP Model [RFC2911] would require a different URL scheme.

The "ipp" URL scheme allows an IPP client to choose an appropriate IPP print service (for example, from a directory). The IPP client can establish an HTTP connection to the specified IPP print service. The IPP client can send IPP protocol requests (for example, a 'Print-Job' request) and receive IPP protocol responses over that HTTP connection.

4.2. IPP URL Scheme Associated Port

All IPP URLs which do NOT explicitly specify a port MUST be resolved to IANA-assigned well-known port 631, as registered in [IANA-PORTREG].

See: IANA Port Numbers Registry [IANA-PORTREG].
See: IPP Protocol [RFC2910].

4.3. IPP URL Scheme Associated MIME Type

All IPP URLs MUST be used to specify network print services which support the "application/ipp" MIME media type as registered in [IANA-MIMEREG] for IPP protocol requests and responses.

See: IANA MIME Media Types Registry [IANA-MIMEREG].
See: IPP Protocol [RFC2910].

4.4. IPP URL Scheme Character Encoding

IPP URLs MUST use [RFC2396] encoding, as do their equivalent HTTP URLs. Characters other than those in the "reserved" and "unsafe" sets [RFC2396] are equivalent to their ""%" HEX HEX" encoding.

4.5. IPP URL Scheme Syntax

The abstract protocol defined in IPP Model [RFC2911] places a limit of 1023 octets (NOT characters) on the length of a URI (see section 4.1.5 'uri' in [RFC2911]).

> Note: IPP Printers ought to be cautious about depending on URI lengths above 255 bytes, because some older client implementations might not properly support these lengths.

IPP URLs MUST be represented in absolute form. Absolute URLs MUST always begin with a scheme name followed by a colon. For definitive information on URL syntax and semantics, see "Uniform Resource Identifiers (URI): Generic Syntax and Semantics" [RFC2396]. This specification adopts the definitions of "host", "port", "abs_path", and "query" from [RFC2396], as updated for IPv6 by [RFC2732].

The IPP URL scheme syntax in ABNF is as follows:

```
ipp-URL = "ipp:" "//" host [ ":" port ] [ abs_path [ "?" query ]]
```

If the port is empty or not given, port 631 is assumed. The semantics are that the identified resource (see section 5.1.2 of [RFC2616]) is located at the IPP print service listening for HTTP connections on that port of that host, and the Request-URI for the identified resource is 'abs_path'.

If the 'abs_path' is not present in the URL, it MUST be given as "/" when used as a Request-URI for a resource (see section 5.1.2 of [RFC2616]).

4.6. IPP URL Examples

Note: Literal IPv4 or IPv6 addresses SHOULD NOT be used in IPP URLs.

4.6.1. IPP Printer URL Examples

The following are examples of well-formed IPP URLs for IPP Printers (for example, to be used as protocol elements in 'printer-uri' operation attributes of 'Print-Job' request messages):

```
ipp://abc.com
ipp://abc.com/printer
ipp://abc.com/printer/tiger
ipp://abc.com/printer/fox
ipp://abc.com/printer/tiger/bob
ipp://abc.com/printer/tiger/ira
```

Each of the above URLs are well-formed URLs for IPP Printers and each would reference a logically different IPP Printer, even though some of those IPP Printers might share the same host system. The 'bob' or 'ira' last path components might represent two different physical printer devices, while 'tiger' might represent some grouping of IPP Printers (for example, a load-balancing spooler). Or the 'bob' and 'ira' last path components might represent separate human recipients on the same physical printer device (for example, a physical printer supporting two job queues). In either case, both 'bob' and 'ira' would behave as different and independent IPP Printers.

The following are examples of well-formed IPP URLs for IPP Printers with (optional) ports and paths:

```
ipp://abc.com
ipp://abc.com/~smith/printer
ipp://abc.com:631/~smith/printer
```

The first and second IPP URLs above MUST be resolved to port 631 (IANA assigned well-known port for IPP). The second and third IPP URLs above are equivalent (see section 4.7 below).

4.6.2. IPP Job URL Examples

The following are examples of well-formed IPP URLs for IPP Jobs (for example, to be used as protocol elements in 'job-uri' attributes of 'Print-Job' response messages):

```
ipp://abc.com/printer/123
ipp://abc.com/printer/tiger/job123
```

IPP Job URLs are valid and meaningful only until Job completion and possibly an implementation defined optional period of persistence after Job completion (see IPP Model [RFC2911]).

Ambiguously, section 4.3.1 'job-uri' of IPP Model [RFC2911] states that:

> "the precise format of a Job URI is implementation dependent."

Thus, the relationship between the value of the "printer-uri" operation attribute used in a 'Print-Job' request and the value of the "job-uri" attribute returned in the corresponding 'Print-Job' response is implementation dependent. Also, section 4.3.3 'job-printer-uri' of IPP Model [RFC2911] states that the 'job-printer-uri' attribute of a Job object:

> "permits a client to identify the Printer object that created this Job object when only the Job object's URI is available to the client."

However, the above statement is false, because the transform from an IPP Job URL to the corresponding IPP Printer URL is unspecified in either IPP Model [RFC2911] or IPP Protocol [RFC2910].

IPP Printers that conform to this specification SHOULD only generate IPP Job URLs (for example, in the "job-uri" attribute in a 'Print-Job' response) by appending exactly one path component to the corresponding IPP Printer URL (for interoperability).

4.7. IPP URL Comparisons

When comparing two IPP URLs to decide if they match or not, an IPP Client MUST use the same rules as those defined for HTTP URI comparisons in [RFC2616], with the sole following exception:

- A port that is empty or not given MUST be treated as equivalent to the well-known port for that IPP URL (port 631);

See: Section 3.2.3 'URI Comparison' in [RFC2616].

5. Conformance Requirements

5.1. IPP Client Conformance Requirements

IPP Clients that conform to this specification:

a) MUST only send IPP protocol connections to the port specified in each given IPP URL (if present) or otherwise to IANA assigned well-known port 631;

b) MUST only send IPP URLs used as protocol elements in outgoing IPP protocol request messages (for example, in the "printer-uri" operation attribute in a 'Print-Job' request) that conform to the ABNF specified in section 4.5 'IPP URL Scheme Syntax' of this document;

c) MUST only convert IPP URLs to their corresponding HTTP URL forms according to the rules in section 5 'IPP URL Scheme' in [RFC2910].

5.2. IPP Printer Conformance Requirements

IPP Printers that conform to this specification:

a) MUST listen for incoming IPP protocol connections on IANA-assigned well-known port 631, unless explicitly configured by system administrators or site policies;

b) SHOULD NOT listen for incoming IPP protocol connections on any other port, unless explicitly configured by system administrators or site policies;

c) SHOULD only accept IPP URLs used as protocol elements in incoming IPP protocol request messages (for example, in the "printer-uri" operation attribute in a 'Print-Job' request) that conform to the ABNF specified in section 4.5 'IPP URL Scheme Syntax' of this document;

d) SHOULD only send IPP URLs used as protocol elements in outgoing IPP protocol response messages (for example, in the "job-uri" attribute in a 'Print-Job' response) that conform to the ABNF specified in section 4.5 'IPP URL Scheme Syntax' of this document;

e) SHOULD only generate IPP Job URLs (for example, in the "job-uri" attribute in a 'Print-Job' response) by appending exactly one path component to the corresponding IPP Printer URL (for

interoperability);

f) SHOULD NOT use literal IPv6 or IPv4 addresses in configured or locally generated IPP URLs.

6. IANA Considerations

This IPP URL Scheme specification does not introduce any additional IANA considerations, beyond those described in [RFC2910] and [RFC2911].

See: Section 6 'IANA Considerations' in [RFC2910]
See: Section 6 'IANA Considerations' in [RFC2911].

7. Internationalization Considerations

This IPP URL Scheme specification does not introduce any additional internationalization considerations, beyond those described in [RFC2910] and [RFC2911].

See: Section 7 'Internationalization Considerations' in [RFC2910].
See: Section 7 'Internationalization Considerations' in [RFC2911].

8. Security Considerations

This IPP URL Scheme specification does not introduce any additional security considerations, beyond those described in [RFC2910] and [RFC2911], except the following:

a) An IPP URL might be faked to point to a rogue IPP print service, thus collecting confidential document contents from IPP clients. Server authentication mechanisms and security mechanisms specified in the IPP Protocol [RFC2910] are sufficient to address this threat.

b) An IPP URL might be used to access an IPP print service by an unauthorized IPP client. Client authentication mechanisms and security mechanisms specified in the IPP Protocol [RFC2910] are sufficient to address this threat.

c) An IPP URL might be used to access an IPP print service at a print protocol application layer gateway (for example, an IPP to LPD gateway [RFC2569]) causing silent compromise of IPP security mechanisms. There is no practical defense against this threat by a client system. System administrators should avoid such compromising configurations.

d) An IPP URL does not have parameters to specify the required client authentication mechanism (for example, 'certificate' as defined in section 4.4.2 'uri-authentication-supported' of IPP Model

[RFC2911]) and required security mechanism (for example, 'tls' as defined in section 4.4.3 'uri-security-supported' of IPP Model [RFC2911]). Service discovery or directory protocols might be used to discover the required client authentication and security mechanisms associated with given IPP URLs.

Historical Note: During the development of this document, consideration was given to the addition of standard IPP URL parameters for the client authentication and security mechanisms. However, based on a strong IETF IPP Working Group concensus, no parameters were added to the "ipp" URL scheme as originally defined in IPP Protocol [RFC2910] in September 2000, for reasons of backwards compatibility with the many currently shipping implementations of IPP/1.1.

See: Section 8 'Security Considerations' in [RFC2910].
See: Section 8 'Security Considerations' in [RFC2911].

9. Normative References

[RFC2234] D. Crocker, P. Overell. Augmented BNF for Syntax Specifications: ABNF, RFC 2234, November 1997.

[RFC2396] T. Berners-Lee, R. Fielding, L. Masinter. Uniform Resource Identifiers (URI): Generic Syntax, RFC 2396, August 1998.

[RFC2616] R. Fielding, J. Gettys, J. Mogul, H. Frystyk, L. Masinter, P. Leach, T. Berners-Lee. Hypertext Transfer Protocol -- HTTP/1.1, RFC 2616, June 1999.

[RFC2732] R. Hinden,B. Carpenter, L. Masinter. Format for Literal IPv6 Addresses in URL's, RFC 2732, December 1999.

[RFC2910] R. Herriot, S. Butler, P. Moore, R. Turner, J. Wenn. IPP/1.1 Encoding and Transport [IPP Protocol], RFC 2910, September 2000.

[RFC2911] T. Hastings, R. Herriot, R. deBry, S. Isaacson, P. Powell. IPP/1.1 Model and Semantics [IPP Model], RFC 2911, September 2000.

[US-ASCII] Coded Character Set -- 7-bit American Standard Code for Information Interchange, ANSI X3.4-1986.

10. Informative References

See: Section 10 'References' in [RFC2910].

[IANA-MIMEREG] IANA MIME Media Types Registry. ftp://ftp.iana.org/in-notes/iana/assignments/media-types/...

[IANA-PORTREG] IANA Port Numbers Registry. ftp://ftp.iana.org/in-notes/iana/assignments/port-numbers

[RFC2569] R. Herriot, T. Hastings, N. Jacobs, J. Martin. Mapping between LPD and IPP Protocols, RFC 2569, April 1999.

[RFC2717] R. Petke, I. King. Registration Procedures for URL Scheme Names, RFC 2717, November 1999.

[RFC2718] L. Masinter, H. Alvestrand, D. Zigmond, R. Petke. Guidelines for new URL Schemes, RFC 2718, November 1999.

[RFC3196] T. Hastings, C. Manros, P. Zehler, C. Kugler, H. Holst. Internet Printing Protocol/1.1: Implementor's Guide, RFC 3196, November 2001.

11. Acknowledgments

This document is a product of the Internet Printing Protocol Working Group of the Internet Engineering Task Force (IETF).

Thanks to Pat Fleming (IBM), Tom Hastings (Xerox), Harry Lewis (IBM), Hugo Parra (Novell), Don Wright (Lexmark), and all the members of the IETF IPP WG.

Section 5 'IPP URL Scheme' in IPP Protocol [RFC2910] was the primary input to this IPP URL Scheme specification.

12. Authors' Addresses

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Usage questions and comments on this IPP URL Scheme should be sent directly to the editors at their above addresses (and to the IPP mailing list, if you are a subscriber - see below).

IPP Web Page: http://www.pwg.org/ipp/
IPP Mailing List: ipp@pwg.org

To subscribe to the IPP mailing list, send the following email:
1) send it to majordomo@pwg.org
2) leave the subject line blank
3) put the following two lines in the message body:
subscribe ipp

```
          end
```

Implementers of this specification are encouraged to join the IPP Mailing List in order to participate in any discussions of clarification issues and comments. In order to reduce spam the mailing list rejects mail from non-subscribers, so you must subscribe to the mailing list in order to send a question or comment to the IPP mailing list.

13. Full Copyright Statement

14. Appendix A - Registration of "ipp" URL Scheme

Note: The following registration obsoletes section 5 'IPP URL Scheme' of IPP Protocol [RFC2911].

URL Scheme Name: ipp

URL Scheme Syntax:

```
   ipp-URL = "ipp:" "//" host [ ":" port ] [ abs_path [ "?" query ]]
```

Character Encoding Considerations:

IPP URLs MUST use [RFC2396] encoding, as do their equivalent HTTP URLs. Characters other than those in the "reserved" and "unsafe" sets [RFC2396] are equivalent to their ""%" HEX HEX" encoding.

Intended Usage:

The intended usage of the "ipp" URL scheme is COMMON.

An "ipp" URL is used to specify the network location of a print service that supports the IPP Protocol [RFC2910], or of a network resource (for example, a print job) managed by such a print service. An IPP client can choose to establish an HTTP connection to the specified print service for transmission of IPP protocol requests (for example, IPP print job submission requests).

Applications or Protocols which use this URL scheme:

See: Section 5 'IPP URL Scheme' in IPP Protocol [RFC2910].

Interoperability Considerations:

See: Section 9 'Interoperability with IPP/1.0 Implementations' in IPP Protocol [RFC2910].

Security Considerations:

See: Section 8 'Security Considerations' in IPP Protocol [RFC2910].

Relevant Publications:

[RFC2910] R. Herriot, S. Butler, P. Moore, R. Turner, J. Wenn. IPP/1.1 Encoding and Transport [IPP Protocol], RFC 2910, September 2000.

[RFC2616] R. Fielding, J. Gettys, J. Mogul, H. Frystyk, L. Masinter, P. Leach, T. Berners-Lee. Hypertext Transfer Protocol -- HTTP/1.1, RFC 2616, June 1999.

[RFCnnnn] R. Herriot, I. McDonald. IPP/1.1: IPP URL Scheme, RFC nnnn, mmmm yyyy.

[Ed Note: The above should be replaced with the correct RFC number and date when this document is published as an RFC.]

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15. Appendix X - Change History

[To be deleted before RFC publication]

20 May 2002 - draft-ietf-ipp-url-scheme-05.txt
- expanded IPP in title of document, per RFC Editor;
- revised 'References' section, separating into 'Normative References' and 'Informative References' sections, per RFC Editor;
- revised 'Abstract' section, to emphasize that this document updates RFC 2910, per Ned Freed;
- revised several sections, deleting repeated paragraphs and references to RFC 2373 "IPv6 Addressing Architecture", per Ned Freed;
- revised 'IPP URL Examples' section, adding examples of IPP URLs used to uniquely identify IPP Jobs, per Ned Freed;
- revised 'IPP URL Examples' section, deleting both IPv4 and IPv6 literal address examples, per Ned Freed;
- revised 'Conformance Requirements' section, to specify requirements both for IPP URLs used for the network location of IPP print services and for IPP URLs used as protocol elements in IPP protocol requests and responses, per Ned Freed;
- revised 'Security Considerations' section, to discuss security threats associated with the use of IPP URLs (see section 2.4 of [RFC2718]), per Ned Freed;
- added 'Appendix A - Registration of "ipp" URL Scheme' with completed form (see section 6.0 'Registration Template' of [RFC2717]).

10 January 2002 - draft-ietf-ipp-url-scheme-04.txt
- final edits after IESG 'last call' comments;
- revised all titles in sections 4.x to remove redundant prefix of 'IPP URL Scheme', for readability;
- revised 'Abstract', section 1 'Introduction', section 4.1 'Applicability and Intended Usage', section 4.5 'IPP URL Scheme Syntax', and section 6 'IANA Considerations', to explicitly state that the "ipp" URL scheme is intended for IANA registration in the IETF URL scheme tree;
- revised section 4.5 'IPP URL Scheme Syntax', to delete references to unused ABNF components from [RFC2396];
- revised section 11 'Authors' Addresses', to update contact info for both editors and to add the IPP Web page and mailing list subscription info;
- moved 'Appendix X - Change History' to back of document, to facilitate final edits for RFC publication (including deletion of change history);

2 April 2001 - draft-ietf-ipp-url-scheme-03.txt
- final edits after IETF IPP WG 'last call' comments;

- revised 'Abstract' and section 1 'Introduction' to remove references to ISSUE's and request for comments to the 'ipp@pwg.org' mailing list, in preparation for publication as an RFC;
- revised section 4.5 'IPP URL Scheme Syntax' to delete all references to HTTP proxy behavior (which IPP does NOT specify), per request of Don Wright;
- revised section 4.6 'IPP URL Examples' to remove note discouraging the use of literal IP addresses in URLs, to remove dependency on Informational [RFC1900];
- revised section 4.7 'IPP URL Comparisons' to specify the use of rules defined in section 3.2.3 'URI Comparison' in [RFC2616], with the sole exception that an empty port MUST be treated as equivalent to the IPP well-known port 631, per request of Don Wright;
- revised section 9 'References' to delete all unused references;
- revised section 11 'Authors' Addresses' to add the address of the IPP WG mailing list for usage questions and comments;

13 February 2001 - draft-ietf-ipp-url-scheme-02.txt

- revised section 3 'IPP Model for Printers and Jobs' and section 4.5 'IPP URL Scheme Syntax' to add notes stating that "IPP URL" (in this document) is a synonym for "ipp-URL" in [RFC2910], per request of Bob Herriot;
- revised section 4.5 'IPP URL Scheme Syntax' to correct typo that showed "http:" rather than "ipp:" in the one-line ABNF, per request of Tom Hastings;
- revised section 4.6 'IPP URL Examples' to add a note discouraging the use of literal IP addresses in URLs, per [RFC2616] and [RFC1900];

5 February 2001 - draft-ietf-ipp-url-scheme-01.txt

- revised section 4.1 'IPP URL Applicability and Intended Usage' to clarify that a given IPP URL MAY identify an IPP Printer object or an IPP Job object, per request of Tom Hastings;
- revised section 4.5 'IPP URL Scheme Syntax' to define IPP URLs consistently with section 3.2.2 'http URL' of HTTP [RFC2616], per request of Tom Hastings;
- revised section 4.5 'IPP URL Scheme Syntax' to clarify that IPP URLs may reference IPP Printer objects, IPP Job objects, or (possibly other future) IPP objects, per request of Bob Herriot;
- added section 4.6 'IPP URL Examples' to supply meaningful examples of IPP URLs with host names, IPv4 addresses, and IPv6 addresses, per request of Tom Hastings;
- added section 4.7 'IPP URL Comparisons' to define IPP URL comparisons consistently with section 3.3 'URI Comparison' of HTTP [RFC2616], per request of Tom Hastings;
- revised section 5.1 'Conformance Requirements for IPP Clients' to clarify that an IPP Client MUST convert IPP URLs to their corresponding HTTP URL forms according to section 5 'IPP URL Scheme' in [RFC2910], per request of Tom Hastings and Bob Herriot;
- revised section 5.1 'Conformance Requirements for IPP Clients' and section 5.2 'Conformance Requirements for IPP Printers' to clarify

that IPP Clients and IPP Printers SHOULD interoperate with IPP/1.0 systems according to section 9 'Interoperability with IPP/1.0 Implementations' in [RFC2910], per request of Carl Kugler;
- revised section 5.2 'Conformance Requirements for IPP Printers' to clarify that an IPP Printer MUST listen on (IANA assigned well-known) port 631, unless explicitly configured otherwise, per request of Michael Sweet;
- revised section 5.2 'Conformance Requirements for IPP Printers' to clarify that an IPP Printer SHOULD NOT listen on ports other than (IANA assigned well-known) port 631, unless explicitly configured, per request of Don Wright;
- revised section 6 'IANA Considerations' to clarify that the sole purpose of the entire document is IANA registration of the "ipp" URL scheme;
- deleted Appendix A 'Registration of IPP Port' as unnecessary (port is already registered);
- deleted Appendix B 'Registration of MIME "application/ipp" as unnecessary (MIME registry has recently caught up to RFC 2910);

11 January 2001 - draft-ietf-ipp-url-scheme-00.txt
- initial version - simple "ipp" URL scheme without parameters or query part (consistent with existing and IPP/1.1 implementations);
- added Appendix A 'Registration of IPP Port' (placeholder) for updated IANA registration of port 631 with references to IPP/1.1;
- added Appendix B 'Registration of MIME "application/ipp"' with updated IANA registration for IPP MIME type with references to both IPP/1.0 and IPP/1.1;

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