

1 Internet Printing Protocol Working Group Bob Herriot
2 INTERNET DRAFT Xerox
3 Expires 11 July 2001 Ira McDonald
4 [Target Category: Standards Track] High North
5 11 January 2001
6
7 Internet Printing Protocol (IPP):
8 IPP URL Scheme
9 <draft-ietf-ipp-url-scheme-00.txt>
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14 Status of this Memo
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32 Abstract
33
34 This document is a product of the Internet Printing Protocol Working
35 Group of the Internet Engineering Task Force (IETF). Comments should
36 be submitted to the ipp@pwg.org mailing list.
37
38 The open issues in this document each begin 'ISSUE_n:'.
39
40 This document specifies the "ipp" URL (Uniform Resource Locator)
41 scheme for specifying the location of an IPP Printer which implements
42 IPP/1.0 [RFC-2565] [RFC-2566], IPP/1.1 [RFC-2910] [RFC-2911], or any
43 later version of IPP. This document is intended for use in
44 registering the "ipp" URL scheme with IANA and fully conforms to the
45 requirements in [RFC-2717].
46
47 The IPP URL scheme defined in this document is based on the ABNF for
48 the basic hierarchical URL syntax in [RFC-2396]; however relative URL
49 forms, parameters, and/or query parts are NOT allowed in an IPP URL.
50 The IPP URL scheme is case-insensitive in the host name or host
51 address part; however the path part is case-sensitive, as in
52 [RFC-2396]. Codepoints outside [US-ASCII] MUST be hex escaped by the
53 mechanism defined in [RFC-2396].
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56

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117 1. Introduction
118

119 See section 1 'Introduction' in [RFC-2911] for a full description of
120 the IPP document set and overview information about IPP.
121

122 This document is a product of the Internet Printing Protocol Working
123 Group of the Internet Engineering Task Force (IETF). Comments should
124 be submitted to the ipp@pwg.org mailing list.
125

126 The open issues in this document each begin 'ISSUE_n:'.
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128 This document specifies the "ipp" URL (Uniform Resource Locator)
129 scheme for specifying the location of an IPP Printer which implements
130 IPP/1.0 [RFC-2565] [RFC-2566], IPP/1.1 [RFC-2910] [RFC-2911], or any
131 later version of IPP. This document is intended for use in
132 registering the "ipp" URL scheme with IANA and fully conforms to the
133 requirements in [RFC-2717].
134

135 This document defines:
136

- IPP URL scheme applicability and intended usage;
- IPP URL scheme associated MIME type (i.e., "application/ipp");
- IPP URL scheme syntax in ABNF [RFC-2234];
- IPP URL scheme character encoding;
- IPP URL scheme IANA, internationalization, and security
considerations.

143 This document is laid out as follows:
144

- Section 2 is the terminology used throughout the document.
- Section 3 provides references to the IPP Printer and IPP Job object
model.
- Section 4 specifies IPP URL scheme.
- Section 5 specifies the conformance requirements for IPP Clients
and IPP Printers that claim conformance to this document.
- Section 6, 7, and 8 specify IANA, internationalization, and
security considerations.
- Sections 9, 10, 11, 12, and 13 list references, acknowledgements,
authors' addresses, change history, and full IETF copyright
statement.

173 2. Terminology
174

175 This specification document uses the terminology defined in this
176 section.
177

178 2.1. Conformance Terminology
179

180 The uppercase terms "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL
181 NOT" "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in
182 this document are to be interpreted as described in [RFC-2119].
183 These terms are used to specify conformance requirements for all
184 implementations of this specification.
185

186 2.2. Model Terminology
187

188 See section 12.2 'Model Terminology' in [RFC-2911].
189

190 3. IPP Model for Printers and Jobs
191

192 See section 2 'IPP Objects', section 2.1 'Printer Object', and
193 section 2.2 'Job Object' in [RFC-2911] for a full description of the
194 IPP object model and terminology.
195

229 4. IPP URL Scheme
230
231
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233

234 4.1. IPP URL Scheme Applicability and Intended Usage
235

236 In this document, "IPP Client" means the software (on some hardware
237 platform) that submits, monitors, and/or manages print jobs via
238 IPP/1.0 [RFC-2565] [RFC-2566], IPP/1.1 [RFC-2910] [RFC-2911], or any
239 later version of IPP to a spooler, gateway, or actual printing
240 device.

241 In this document, "IPP Printer" means the software (on some hardware
242 platform) that receives print jobs and/or job operations via IPP/1.0
243 [RFC-2565] [RFC-2566], IPP/1.1 [RFC-2910] [RFC-2911], or any later
244 version of IPP from an "IPP Client".
245

246 The "IPP Printer" is identified via an IPP URL. This IPP URL MUST
247 NOT contain any parameters or query part.
248

249 The IPP URL scheme defined in this document is based on the ABNF for
250 the basic hierarchical URL syntax in [RFC-2396]; however relative URL
251 forms, parameters, and/or query parts are NOT allowed in an IPP URL.
252 The IPP URL scheme is case-insensitive in the host name or host
253 address part; however the path part is case-sensitive, as in
254 [RFC-2396]. Codepoints outside [US-ASCII] MUST be hex escaped by the
255 mechanism defined in [RFC-2396].
256

257
258 4.2. IPP URL Scheme Associated IPP Port
259
260

261 All IPP URLs which do NOT explicitly specify a port MUST be used over
262 IANA-assigned port 631 for the IPP protocol described in [RFC-2910].
263

264 See: Appendix A in this document which updates the existing IPP port
265 registration with IANA.
266

267
268 4.3. IPP URL Scheme Associated MIME Type
269
270

271 All IPP protocol operations (requests and responses) MUST be conveyed
272 in an 'application/ipp' MIME media type as registered in
273 [IANA-MIMEREG]. IPP URLs MUST refer to IPP Printers which support
274 this 'application/ipp' MIME media type.
275

276 See: Appendix B in this document.
277

285 4.4. IPP URL Scheme Syntax in ABNF
286

287 The "ipp" URL scheme syntax is formally specified below in ABNF
288 [RFC-2234]. This URL syntax is derived from [RFC-2396], [RFC-2732],
289 and [RFC-2373].

```
290 ; note - parameters are NOT allowed on IPP URLs
291 ; note - query part is NOT allowed on IPP URLs
292 ippURI = "ipp://" hostport [ path ]
293
294 hostport = host [ ":" port ]
295 host = hostname | IPv4address | IPv6reference
296 hostname = *( domainlabel ".") toplabel [ "." ]
297 domainlabel = alphanum | alphanum *( alphanum | "-" ) alphanum
298 toplabel = alpha | alpha *( alphanum | "-" ) alphanum
299 port = *digit
300
301 ; note - IPv6 support is added here
302 ; see RFC 2732 and RFC 2373 which update RFC 2396
303 IPv6reference = "[" IPv6address "]"
304 IPv6address = hexpart [ ":" IPv4address ]
305 IPv4address = 1*3digit "." 1*3digit "." 1*3digit "."
306
307 hexpart = hexseq | hexseq "::" [ hexseq ] | ":" [ hexseq ]
308 hexseq = hex4 *( ":" hex4 )
309 hex4 = 1*4hex
310
311 path = "/" segments
312 segments = segment *( "/" segment )
313
314 ; note - parameters are NOT allowed on IPP URLs
315 ; see RFC 2396 which does allow parameters
316 segment = *segchar
317 segchar = unreserved | escaped |
318     ":" | "@" | "&" | "=" | "+" | "$" | ","
319
320 ; note - "[" and "]" are ADDED to 'reserved' for IPv6
321 ; see RFC 2732 and RFC 2373 which update RFC 2396
322 reserved = ";" | "/" | "?" | ":" | "@" | "&" | "=" | "+"
323             | "$" | "," | "[" | "]"
324
325 unreserved = alphanum | mark
326 mark = "-" | "_" | "." | "!" | "~" | "*" | "'"
327             | "(" | ")"
328
329 escaped = "%" hex hex
330 hex = digit | "A" | "B" | "C" | "D" | "E" | "F"
331             | "a" | "b" | "c" | "d" | "e" | "f"
332
333 alphanum = alpha | digit
```

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337 Internet Draft IPP URL Scheme 11 January 2001
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339 alpha = lowalpha | upalpha
340
341 lowalpha = "a" | "b" | "c" | "d" | "e" | "f" | "g" | "h" | "i" |
342 "j" | "k" | "l" | "m" | "n" | "o" | "p" | "q" | "r" |
343 "s" | "t" | "u" | "v" | "w" | "x" | "Y" | "z"
344 upalpha = "A" | "B" | "C" | "D" | "E" | "F" | "G" | "H" | "I" |
345 "J" | "K" | "L" | "M" | "N" | "O" | "P" | "Q" | "R" |
346 "S" | "T" | "U" | "V" | "W" | "X" | "Y" | "Z"
347 digit = "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" |
348 "8" | "9"
349
350
351

4.5. IPP URL Scheme Character Encoding

The IPP URL scheme defined in this document is based on the ABNF for the basic hierarchical URL syntax in [RFC-2396]; however relative URL forms, parameters, and/or query parts are NOT allowed in an IPP URL. The IPP URL scheme is case-insensitive in the host name or host address part; however the path part is case-sensitive, as in [RFC-2396]. Codepoints outside [US-ASCII] MUST be hex escaped by the mechanism defined in [RFC-2396].

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391 Herriot, McDonald Expires 11 July 2001 [Page 7]
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397 5. Conformance Requirements
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401 5.1. Conformance Requirements for IPP Clients
402
403 IPP Clients that conform to this specification:
404

- 405 a) MUST send valid IPP Jobs on port 631 (IANA-assigned default port
406 for IPP) when contacting IPP Printers via IPP URLs that do NOT
407 specify an explicit port;
- 409 b) MUST NOT send otherwise valid IPP Jobs on any port other than 631
410 (IANA-assigned default port for IPP) when contacting IPP Printers
411 via IPP URLs that do NOT specify an explicit port;
- 413 c) MUST conform to the ABNF for IPP URLs specified in section 4.4 of
414 this document.

418 5.2. Conformance Requirements for IPP Printers
419
420 IPP Printers that conform to this specification:
421

- 422 a) MUST accept valid IPP Jobs on port 631 (IANA-assigned default port
423 for IPP) from IPP Clients that follow required client
424 authentication and security mechanisms;
- 426 b) MUST reject otherwise valid IPP Jobs on any port other than 631
427 (IANA-assigned default port for IPP) from IPP Clients that follow
428 required client authentication and security mechanisms, unless
429 explicitly configured by system administrators or site policies
430 (e.g., 'trap doors' on port 80 are prohibited);
- 432 c) MUST reject received IPP URLs (e.g. in the "printer-uri"
433 operation attribute in 'Print-Job') that do not conform to the
434 ABNF for IPP URLs specified in section 4.4 of this document.

453 6. IANA Considerations

454
455 This IPP URL Scheme specification does not introduce any additional
456 IANA considerations, beyond those described in [RFC-2910] and
457 [RFC-2911].

458
459 See: Section 6 'IANA Considerations' in [RFC-2910]
460 See: Section 6 'IANA Considerations' in [RFC-2911].

461
462
463 7. Internationalization Considerations

464
465 This IPP URL Scheme specification does not introduce any additional
466 internationalization considerations, beyond those described in
467 [RFC-2910] and [RFC-2911].

468
469
470 See: Section 7 'Internationalization Considerations' in [RFC-2910].
471 See: Section 7 'Internationalization Considerations' in [RFC-2911].

472
473
474 8. Security Considerations

475
476 This IPP URL Scheme specification does not introduce any additional
477 security considerations, beyond those described in [RFC-2910] and
478 [RFC-2911].

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481 See: Section 8 'Security Considerations' in [RFC-2910].
482 See: Section 8 'Security Considerations' in [RFC-2911].

509 9. References
510

511 See: Section 10 'References' in [RFC-2910].
512 See: Section 9 'References' in [RFC-2911].
513

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595
596
597
598 10. Acknowledgments
599
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601 Group of the Internet Engineering Task Force (IETF). Comments should
602 be submitted to the ipp@pwg.org mailing list.
603
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605 and Hugo Parra (Novell).
606
607 Section 5 'IPP URL Scheme' in IPP/1.1 Encoding and Transport
608 [RFC-2910] was the primary input to this IPP URL Scheme
609 specification.
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615 Herriot, McDonald Expires 11 July 2001 [Page 11]
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621 11. Authors' Addresses

622
623 Robert Herriot
624 Xerox Corp
625 3400 Hill View Ave, Building 1
626 Palo Alto, CA 94304
627
628 Phone: +1 650-813-7696
629 Fax: +1 650-813-6860
630 Email: robert.herriot@pahv.xerox.com

631
632
633 Ira McDonald
634 High North Inc
635 221 Ridge Ave
636 Grand Marais, MI 49839
637

638 Phone: +1 906-494-2434
639 Email: imcdonald@crt.xerox.com
640 Email: imcdonald@sharplabs.com

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671 Herriot, McDonald Expires 11 July 2001 [Page 12]
672

677 12. Appendix A - Registration of IPP Port

678 [Placeholder for updated IANA registration of IPP Port (631) - need
680 input from Carl-Uno Manros].

681
682
683 13. Appendix B - Registration of MIME "application/ipp"

684 This appendix contains the information that IANA requires for
685 registering a MIME media type. The information following this
686 paragraph will be forwarded to IANA to update the registration of
687 "application/ipp", whose contents are defined in Section 3 'Encoding
688 of the Operation Layer' in [RFC-2910].

689 MIME type name: application

690 MIME subtype name: ipp

691 A Content-Type of "application/ipp" indicates an Internet Printing
692 Protocol message body (request or response). Currently there are two
693 versions: a) IPP/1.0 [Experimental], whose syntax is described in
694 Section 3 'Encoding of the Operation Layer' in [RFC-2565], and whose
695 semantics are described in [RFC-2566]; and b) IPP/1.1 [Standards
696 Track], whose syntax is described in Section 3 'Encoding of the
697 Operation Layer' of [RFC-2910], and whose semantics are described in
698 [RFC-2911].

699 Required parameters: none

700 Optional parameters: none

701 Encoding considerations:

702 IPP/1.1 protocol requests/responses MAY contain long lines and ALWAYS
703 contain binary data (for example attribute value lengths).

704 Security considerations:

705 IPP/1.1 protocol requests/responses do not introduce any security
706 risks not already inherent in the underlying transport protocols.
707 Protocol mixed-version interworking rules in [RFC-2911] as well as
708 protocol encoding rules in [RFC-2910] are complete and unambiguous.

709 Interoperability considerations:

710 IPP/1.1 requests (generated by clients) and responses (generated by
711 servers) MUST comply with all conformance requirements imposed by the
712 normative specifications [RFC-2911] and [RFC-2910]. Protocol
713

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729 Internet Draft IPP URL Scheme 11 January 2001
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731 encoding rules specified in [RFC-2910] are comprehensive, so that
732 interoperability between conforming implementations is guaranteed
733 (although support for specific optional features is not ensured).
734 Both the "charset" and "natural-language" of all IPP/1.1 attribute
735 values which are a LOCALIZED-STRING are explicit within IPP protocol
736 requests/responses (without recourse to any external information in
737 HTTP, SMTP, or other message transport headers).
738

739 Published specifications:
740

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744

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756

757 Applications which use this media type:
758

759 Internet Printing Protocol (IPP) print clients and print servers,
760 communicating using HTTP/1.1 (see [RFC-2910]), SMTP/ESMTP, FTP, or
761 other transport protocol. Messages of type "application/ipp" are
762 self-contained and transport-independent, including "charset" and
763 "natural-language" context for any LOCALIZED-STRING value.
764

765 Person & email address to contact for further information:
766

767 Tom Hastings
768 Xerox Corporation
769 737 Hawaii St. ESAE-231
770 El Segundo, CA
771

772 Phone: 310-333-6413
773 Fax: 310-333-5514
774 Email: hastings@cp10.es.xerox.com
775

776 or
777

778 Robert Herriot
779 Xerox Corporation
780 3400 Hillview Ave., Bldg #1
781 Palo Alto, CA 94304
782

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784

788 Phone: 650-813-7696
789 Fax: 650-813-6860
790 Email: robert.herriot@pahv.xerox.com
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792 Intended usage:
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794 COMMON
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798 14. Appendix C - Change History
799

800 [To be deleted before RFC publication]
801

802 11 January 2001 - draft-ietf-ipp-url-scheme-00.txt
803 - initial version - simple 'ipp:' URL scheme without parameters or
804 query part (consistent with existing IPP/1.0 and IPP/1.1
805 implementations).
806
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