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3 There (3) issues in this document, each beginning 'ISSUE_n:'.
4

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9 7 July 2000
10

11 Internet Printing Protocol (IPP):
12 Resource Objects and Get Resource Operations
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14

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35 Abstract 36

37 This document is a submission to the Internet Printing Protocol
38 Working Group of the Internet Engineering Task Force (IETF).
39 Comments should be submitted to the ipp@pwg.org mailing list.
40

41 This IPP Get Resource document specifies an extension to IPP/1.0
42 [RFC-2565] [RFC-2566] and IPP/1.1 [IPP-MOD] [IPP-PRO]. This document
43 extends the current closed IPP object model with a passive
44 polymorphic object that is intended to satisfy most needs for new
45 object types in the long-term evolution of IPP via an extensible
46 object framework.
47

48 This document defines: Resource object (passive polymorphic object);
49 Resource get operations (e.g., Get-Resource-Attributes); Resource
50 attributes (e.g., "resource-name"); new Printer attributes (e.g.,
51 "resource-type-supported"); Resource type of Driver (a morph of the
52 Resource object); methods for supporting 'driver download' to IPP
53 Client systems.
54
55

60
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176
177 1. Introduction
178

179 See section 1 'Introduction' in [IPP-MOD] for a full description of
180 the IPP document set and overview information about IPP.

181
182 This document is a submission to the Internet Printing Protocol
183 Working Group of the Internet Engineering Task Force (IETF).
184 Comments should be submitted to the ipp@pwg.org mailing list.
185

186 This IPP Get Resource document specifies an extension to IPP/1.0
187 [RFC-2565] [RFC-2566] and IPP/1.1 [IPP-MOD] [IPP-PRO]. This document
188 extends the current closed IPP object model with a passive
189 polymorphic object which is intended to satisfy most growth needs for
190 new object types in the long-term evolution of IPP via an extensible
191 object framework.
192

193 This document defines: Resource object (passive polymorphic object);
194 Resource get operations (e.g., Get-Resource-Attributes); Resource
195 attributes (e.g., "resource-name"); new Printer attributes (e.g.,
196 "resource-type-supported"); Resource type of Driver (a morph of the
197 Resource object); methods for supporting 'driver download' to IPP
198 Client systems.
199

200 This document does not specify other possible Resource operations
201 (e.g., 'Create-Resource') or Resource types (e.g., 'font'). A future
202 document may specify a complete set of system admin operations for
203 Resource objects.
204

205 This document is laid out as follows:

- 206 - Section 2 adds the Resource object to the IPP object model.
- 207
- 208 - Section 3 is the terminology used throughout the document.
- 209
- 210 - Section 4 specifies the operations on Resource objects, including
- 211 new status codes for Resource operations.
- 212
- 213 - Section 5 specifies the attributes common to all Resource objects.
- 214
- 215 - Section 6 specifies the Driver Resource type and its additional
- 216 attributes - to allow client print support (e.g., driver) download
- 217 (all or part of an IPP Client) from an IPP Printer.
- 218
- 219 - Section 7 specifies the conformance requirements for this document.
- 220
- 221 - Section 8, 9, and 10 specify IANA, internationalization, and
- 222 security considerations.
- 223
- 224 - Section 11 allocates new protocol encoding values for this
- 225 document.
- 226

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- Sections 12, 13, 14, and 15 list references, authors' addresses, change history, and full IETF copyright statement.

2. IPP Model for Resources

See section 2 'IPP Objects' in [IPP-MOD] for a full description of the IPP object model and terminology.

2.1. Resource Object

IPP Resource objects are used to model installed features or capabilities of IPP Printers (e.g., 'font'). All Resource object instances contain a common set of base Resource object attributes.

Resource object instances MAY have an additional set of attributes, according to their "resource-type" and IPP Printer implementation.

Resource objects instances MAY also have associated data, according to their "resource-type" and IPP Printer implementation. Resource data (if any) is available by reference in "resource-data-uri" or by value if "resource-data-present" is 'true' (i.e., a local copy of the Resource data is available on the IPP Printer).

Section 4 describes each of the Resource operations in detail.

290
291 3. Terminology
292

293 This specification document uses the terminology defined in this
294 section.
295

296
297 3.1. Conformance Terminology
298

299 The terms "MUST", "MUST NOT", "REQUIRED", "SHOULD", "SHOULD NOT",
300 "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be
301 interpreted as described in [RFC-2119]. These terms are used to
302 specify conformance requirements which apply if this specification is
303 implemented (in addition to IPP/1.0 or higher).
304

305
306 3.2. Model Terminology
307

308 See section 12.2 'Model Terminology' in [IPP-MOD].
309
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340

348 4. Resource Operations
349

350 The common semantics of all IPP Resource operations are the ones
351 defined for all IPP operations in [IPP-MOD], e.g., "operation-id",
352 "status-code", "attributes-charset", etc.
353

354 See section 3.1 'Common Semantics' in [IPP-MOD].
355

356 The following three Resource operations are REQUIRED for all IPP
357 Printers to implement, if they implement Resource objects.
358
359
360

361 4.1. Get-Resource-Attributes Operation
362

363 REQUIRED - for IPP Printers to implement.
364

365 This operation allows an IPP Client to request the values of
366 attributes of a Resource object instance and is similar to the
367 Get-Job-Attributes operation (see section 3.2.5 in [IPP-MOD]). The
368 only differences are that the operation is directed at a Resource
369 object instance rather than a Job object instance, there is a
370 "resource-type" operation attribute required when querying a Resource
371 object, and the returned attribute group is a set of Resource object
372 attributes rather than a set of Job object attributes.
373

374 For Resources, the possible names of attribute groups are:
375

- 376 - 'resource-template': the subset of the Resource Template
 - 377 attributes that the implementation supports for Resource objects.
 - 378 - 'resource-description': the subset of the Resource Description
 - 379 attributes that the implementation supports for Resource objects.
 - 380 - 'all': the special group 'all' that includes all attributes that
 - 381 the implementation supports for Resource objects.
- 382
383

384 Since an IPP Client MAY request specific attributes or named groups,
385 there is a potential that there is some overlap. For example, if an
386 IPP Client requests 'resource-create-time' and
387 'resource-description', the IPP Client is actually requesting the
388 "resource-create-time" attribute once by naming it explicitly, and
389 once by inclusion in the 'resource-description' group. In such
390 cases, the IPP Printer object NEED NOT return the attribute only once
391 in the response even if it is requested multiple times. The IPP
392 Client SHOULD NOT request the same attribute in multiple ways.
393

394 It is NOT REQUIRED that a Resource object instance support all
395 attributes belonging to a group (since some attributes are OPTIONAL).
396 However it is REQUIRED that each Resource object instance support all
397

402
403 group names.

404
405
406
407 4.1.1.1. Get-Resource-Attributes Request

408
409 The following groups of attributes are part of the
410 Get-Resource-Attributes Request when the request is directed at a
411 Resource object:

412
413
414 Group 1: Operation Attributes

415
416 Natural Language and Character Set:

417 The "attributes-charset" and "attributes-natural-language"
418 attributes as described in section 3.1.4.1 in [IPP-MOD].

419
420 Target:

421 The "printer-uri" (uri) operation attribute which is the target for
422 this operation as described in section 3.1.5 in [IPP-MOD].

423
424 ISSUE_1: The target of all IPP Resource operations is always
425 simply "printer-uri" and separate required operation attributes are
426 used to specify resource type and name or ID. This is like IPP
427 Subscription objects but unlike the earlier IPP Job objects.
428 Should we continue to follow the IPP Subscription object model?

429
430 Resource Type:

431 The "resource-type (type2 keyword)" attribute as described in
432 section 5.2.1 in this document.

433
434 Resource Name or ID:

435 The "resource-name (name(127))" attribute as described in section
436 5.2.2 in this document OR
437 the "resource-id (integer(1:MAX))" attribute as described in
438 section 5.2.3 in this document.

439
440 Requesting User Name:

441 The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied
442 by the IPP Client as described in section 8.3 in [IPP-MOD].

443
444 "requested-attributes" (1setOf keyword):

445 The IPP Client OPTIONALLY supplies this attribute. The IPP Printer
446 MUST support this attribute. It is a set of attribute names and/or
447 attribute group names in whose values the requester is interested.
448 If the IPP Client omits this attribute, the IPP Printer MUST
449 respond as if this attribute had been supplied with a value of
450 'all'.

461
462 4.1.2. Get-Resource-Attributes Response
463

464 The Printer object returns the following sets of attributes as part
465 of the Get-Resource-Attributes Response:
466

467
468 Group 1: Operation Attributes
469

470 Status Message:

471 In addition to the REQUIRED status code returned in every response,
472 the response OPTIONALLY includes a "status-message" (text(255))
473 and/or a "detailed-status-message" (text(MAX)) operation attribute
474 as described in sections 13 and 3.1.6 in [IPP-MOD].
475

476 Natural Language and Character Set:

477 The "attributes-charset" and "attributes-natural-language"
478 attributes as described in section 3.1.4.2 in [IPP-MOD]. The
479 "attributes-natural-language" MAY be the natural language of the
480 Resource object, rather than the one requested.
481

482
483 Group 2: Unsupported Attributes
484

485 See section 3.1.7 in [IPP-MOD] for details on returning Unsupported
486 Attributes.
487

488 The response NEED NOT contain the "requested-attributes" operation
489 attribute with any supplied values (attribute keywords) that were
490 requested by the IPP Client but are not supported by the IPP
491 Printer. If the Printer object does include unsupported attributes
492 referenced in "requested-attributes" and such attributes include
493 group names, such as 'all', the unsupported attributes MUST NOT
494 include attributes described in this document but not supported by
495 the implementation.
496

497
498 Group 3: Resource Object Attributes
499

500 This is the set of requested attributes and their current values.
501 The IPP Printer ignores (does not respond with) any requested
502 attribute or value which is not supported or which is restricted by
503 the security policy in force, including whether the requesting user
504 is the user that created the Resource. However, the IPP Printer
505 MUST respond with the 'unknown' value for any supported attribute
506 (including all REQUIRED attributes) for which the IPP Printer does
507 not know the value, unless it would violate the security policy.
508 See the description of the "out-of-band" values in the beginning of
509 Section 4.1 in [IPP-MOD].
510

517
518
519
520 4.2. Get-Resource-Data Operation

521
522 REQUIRED - for IPP Printers to implement.

523
524 This operation allows an IPP Client to request the values of
525 attributes of a Resource object instance AND the value of associated
526 Resource data (i.e., this operation is like 'Print-Job'). This
527 operation is a strict superset of the Get-Resource-Attributes
528 operation above. The only difference is that the operation returns
529 Resource data in addition to Resource attributes. This operation is
530 only legal for certain values of "resource-type".
531

532 Note: This operation is defined (rather than overloading the
533 'Get-Resource-Attributes' operation above) to simplify access control
534 policies. Note that many possible future Resource types (e.g,
535 'font') have copyright and intellectual property considerations with
536 respect to IPP Clients reading their associated data.
537

538
539 4.2.1. Get-Resource-Data Request

540 See section 4.1.1 'Get-Resource-Attributes Request' in this document.

541
542 The following groups of attributes are part of the Get-Resources
543 request:
544

545
546
547 Group 1: Operation Attributes

548
549 See 'Group 1: Operation Attributes' in section 4.1.1
550 'Get-Resource-Attributes Request'.
551

552
553 4.2.2. Get-Resource-Data Response

554 See section 4.1.2 'Get-Resource-Attributes Response' in this
555 document.
556

557
558
559 Group 1: Operation Attributes

560
561 See 'Group 1: Operation Attributes' in section 4.1.2
562 'Get-Resource-Attributes Response'.
563

564
565 Group 2: Unsupported Attributes
566

574 See 'Group 2: Unsupported Attributes' in section 4.1.2
575 'Get-Resource-Attributes Response'.
576

577
578 Group 3: Resource Object Attributes
579

580 See 'Group 3: Resource Object Attributes' in section 4.1.2
581 'Get-Resource-Attributes Response'.
582

583 Group 4: Resource Data Content
584

585 See section 5.3.6 'resource-data-present' in this document.
586 See section 3.2.1.1 'Print-Job Request' in [IPP-MOD].
587

588 The IPP Printer MUST return the Resource data content (if any) to
589 the IPP Client, within the constraints of administratively
590 configured access control policies and any applicable copyright or
591 other intellectual property considerations.
592

593
594
595 4.3. Get-Resources Operation
596

597 REQUIRED - for IPP Printers to implement.
598

599 This operation allows an IPP Client to retrieve the list of Resource
600 object instances (of a specified resource type) belonging to the
601 target Printer object. The IPP Client may also supply a list of
602 Resource attribute names and/or attribute group names. A group of
603 Resource object attributes will be returned for each Resource object
604 instance that is returned.
605

606 This operation is similar to the Get-Resource-Attributes operation,
607 except that this Get-Resources operation returns attributes from
608 possibly more than one object.
609

610 See section 3.2.6 'Get-Jobs Operation' in [IPP-MOD].
611
612

613
614 4.3.1. Get-Resources Request
615

616 The IPP Client submits the Get-Resources request to an IPP Printer
617 object.
618

619 The following groups of attributes are part of the Get-Resources
620 request:
621

622
623 Group 1: Operation Attributes
624

631
632 See 'Group 1: Operation Attributes' in section 4.1.1
633 'Get-Resource-Attributes Request'.
634

635 Resource Name or ID:
636 [omitted]

637
638 "limit" (integer(1:MAX)):
639 [added]

640 The IPP Client OPTIONALLY supplies this attribute. The IPP Printer
641 MUST MUST support this attribute. It is an integer value that
642 determines the maximum number of resources that an IPP Client will
643 receive from the IPP Printer.
644

645
646 Groups 2 to N: Resource Filter Attributes
647 [added]

648
649 See 'Group 3: Resource Object Attributes' in section 4.1.2
650 'Get-Resource-Attributes Response'.
651

652 This is the set of filter attributes and their filter values. The
653 IPP Printer ignores Resources which do not satisfy the specified
654 filter. A multi-valued filter attribute matches if the
655 corresponding Resource object instance attribute contains all of
656 the one or more values of the multi-valued filter attribute.
657

658 The filter criteria in each Resource Filter Attribute group MUST
659 all be true for a match (logical AND within the set). But only ONE
660 Resource Filter Group need be true for a match (logical OR across
661 the sets).
662

663
664
665 4.3.2. Get-Resources Response

666
667 The Printer object returns all of the Resource object instances, up
668 to the number specified by the "limit" attribute, that match the
669 criteria as defined by the filter attribute values supplied by the
670 IPP Client in the request. It is possible that no Resource objects
671 are returned since there may literally be none at the Printer, or
672 there may be no Resource objects that match the criteria supplied by
673 the IPP Client. If the IPP Client requests any Resource attributes
674 at all, there is a set of Resource Object Attributes returned for
675 each Resource object instance.
676

677 It is not an error for the IPP Printer to return 0 Resources. If the
678 response returns 0 Resources because there are no Resources matching
679 the criteria, and the request would have returned 1 or more Resources
680 with a status code of 'successful-ok' if there had been Resources
681 matching the criteria, then the status code for 0 Resources MUST be
682

687
688 'successful-ok'.
689

690
691 Group 1: Operation Attributes

692
693 See 'Group 1: Operation Attributes' in section 4.3.1
694 'Get-Resources Request'.
695

696
697 Group 2: Unsupported Attributes

698
699 See 'Group 2: Unsupported Attributes' in section 4.1.2
700 'Get-Resource-Attributes Response'.
701

702
703 Groups 3 to N: Resource Object Attributes

704
705 See 'Group 3: Resource Object Attributes' in section 4.1.2
706 'Get-Resource-Attributes Response'.
707

708 Resource object instances are returned sorted by "resource-id".
709

710 ISSUE_2: Resource object instances are always returned sorted by
711 "resource-id" and not by "resource-name" (more user-friendly).
712 Should we add an operation attribute to control the sort order?
713

714
715
716 4.4. Resource Operation Response Status Codes

717 client-error-not-authenticated
718 client-error-not-authorized
719 client-error-resource-type-not-supported
720 client-error-resource-data-not-supported
721 client-error-resource-data-not-present
722
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746
 747 5. Resource Attributes
 748
 749

750
 751 5.1. Table of Required Resource Attributes
 752

753 All IPP Printers that support Resource objects MUST implement the
 754 following REQUIRED attributes defined in this specification (on the
 755 Resource object or the Printer object):
 756

Resource Attribute	Resource Attribute Type
Operation or Resource Group	
Printer Attribute	Printer Attribute Type
-----	-----
resource-type	(type2 keyword)
resource-type	[Operation group]
resource-type-supported	(1setOf type2 keyword)
resource-name	(name(127))
resource-name	[Operation group]
[none]	
resource-id	(integer(1:MAX))
resource-id	[Operation group]
max-resources-supported	(integer(0:MAX))
resource-printer-uri	(uri)
printer-uri	[Operation group]
printer-uri-supported	(1setOf uri)
resource-charset	(charset)
attributes-charset	[Operation group]
charset-configured	(charset)
charset-supported	(1setOf charset)
resource-natural-language	(naturalLanguage)
attributes-natural-language	[Operation group]
natural-language-configured	(naturalLanguage)
generated-natural-language-supported	(1setOf naturalLanguage)
resource-data-present	(boolean)
resource-data-present	[Resource group]
resource-data-present-supported	(1setOf boolean)
resource-data-uri	(1setOf uri)
resource-data-uri	[Resource group]
resource-data-schemes-supported	(1setOf uri)
resource-data-k-octets	(integer(0:MAX))

801			
802	resource-data-k-octets		[Resource group]
803	resource-data-k-octets-supported		(rangeOfInteger (0:MAX))
804			
805	resource-data-compression		(type3 keyword)
806	resource-data-compression		[Resource group]
807	compression-supported		(1setOf type3 keyword)
808			
809	resource-create-user-name		(name(MAX))
810	requesting-user-name		[Operation group]
811	[none]		
812			
813	resource-create-date-time		(dateTime)
814	resource-create-date-time		[Resource group]
815	[none]		
816			
817	resource-create-time		(integer(0:MAX))
818	[none]		
819	printer-current-time		(integer(0:MAX))
820			
821	resource-expiration-time		(integer(0:MAX))
822	[none]		
823	[printer-current-time + duration]		
824			
825	resource-duration		(integer(0:MAX))
826	resource-duration		[Resource group]
827	resource-duration-default		(integer(0:MAX))
828	resource-duration-supported		(rangeOfInteger(0:MAX))
829			
830	resource-persistence		(boolean)
831	resource-persistence		[Resource group]
832	resource-persistence-supported		(boolean)
833			
834			

835 5.2. Table of Optional Resource Attributes

836
 837 All IPP Printers that support Resource objects MAY implement the
 838 following OPTIONAL attributes defined in this specification (on the
 839 Resource object or the Printer object):

841 Resource Attribute	Resource Attribute Type
842 Operation or Resource Group	
843 Printer Attribute	Printer Attribute Type
844 -----	-----
845 resource-info	(text(127))
846 resource-info	[Resource group]
847 [none]	
848 resource-document-formats	(1setOf mimeType)
849 document-format-default	(mimeType)
850 document-format-supported	(1setOf mimeType)
851	
852 resource-os-types	(1setOf type2 keyword)
853	

859 resource-os-types-default (1setOf type2 keyword)
860 resource-os-types-supported (1setOf type2 keyword)

861
862 resource-change-time (integer(0:MAX))
863 [none]
864 [none]

865
866 resource-refresh-time (integer(0:MAX))
867 [none]
868 [none]

869
870
871 5.3. Resource Template Attributes
872

873
874
875 5.3.1. resource-info (text(127))
876

877 OPTIONAL - for IPP Printers to implement.
878

879 This attribute specifies descriptive information about this Resource
880 object. This may include manufacturer, version, copyright, etc.
881

882 See section 4.4.6 'printer-info' and section 4.4.9
883 'printer-make-and-model' in [IPP-MOD].
884

885
886
887 5.3.2. resource-charset (charset)
888

889 REQUIRED - for IPP Printers to implement.
890

891 This attribute specifies the charset of 'text' and 'name' attributes
892 of the Resource and of textual data in the associated Resource data
893 (if any).
894

895
896
897 5.3.3. resource-natural-language (naturalLanguage)
898

899 REQUIRED - for IPP Printers to implement.
900

901 This attribute specifies the natural language of 'text' and 'name'
902 attributes of the Resource and of textual data in the associated
903 Resource data (if any).
904

916
917
918 5.3.4. resource-document-formats (1setOf mimeType)

919
920 OPTIONAL - for IPP Printers to implement.

921
922 This attribute specifies the list of document formats supported by
923 the Resource.

924
925
926
927 5.3.5. resource-os-types (1setOf type2 keyword)

928
929 OPTIONAL - for IPP Printers to implement.

930
931 This attribute specifies the list of target operating system types of
932 the Resource.

933
934 See IANA registry of operating system names at [OS-TYPE].
935

936
937
938 5.3.6. resource-data-present (boolean)

939
940 REQUIRED - for IPP Printers to implement.

941
942 The attribute indicates whether or not a local copy of the Resource
943 data is present at the IPP Printer.

944
945 When "resource-data-present" is 'true' on a Resource object instance,
946 it indicates that the IPP Printer has stored a local copy of the
947 Resource data or has fetched a local copy of the Resource data that
948 was specified by reference in "resource-data-uri".
949

950
951 When "resource-data-present" is 'false' on a Resource object instance
952 and "resource-data-uri" is empty, it indicates that there is no
953 Resource data.

954
955 When "resource-data-present" is 'false' on a Resource object instance
956 and "resource-data-uri" is non-empty, it indicates that the IPP
957 Printer has NOT yet fetched a local copy of the Resource data that
958 was specified by reference and the value of "resource-data-k-octets"
959 is unverified.

960
961 See section 5.3.7 "resource-data-uri" in this document.

962
963 See section 5.3.8 "resource-data-k-octets" in this document.
964
965
966
967

970
971 Internet Draft IPP Get Resource Operations 7 July 2000
972
973
974
975 5.3.7. resource-data-uri (1setOf uri)
976
977 REQUIRED - for IPP Printers to implement.
978
979 This attribute contains the URI of associated Resource data (if any)
980 as a reference.
981
982 Lazy Refresh:
983 An IPP Printer NEED NOT immediately fetch a local copy of the
984 Resource data specified by reference in "resource-data-uri", but MUST
985 set "resource-data-present" to 'false' until a local copy is fetched.
986
987 When an IPP Printer does fetch a local copy of the Resource data, it
988 MUST set (REQUIRED) "resource-data-present" to 'true', set (REQUIRED)
989 "resource-data-k-octets" to the actual size, and update the timestamp
990 in the (OPTIONAL) "resource-refresh-time" attribute.
991
992 ISSUE_3: This 'lazy refresh' behavior may have performance and
993 'stale data' consequences for IPP Clients. Because the manufacturer
994 may also be slow to inform installed IPP Printers of a new version of
995 a Resource (for update by means outside of this specification) the
996 'stale data' problem may also apply to IPP Printers. Should we add
997 an operation attribute to prevent this 'lazy refresh' behavior?
998
999 See section 5.3.6 "resource-data-present" in this document.
1000 See section 4.4.27 'reference-uri-schemes-supported' in [IPP-MOD].
1001 See section 3.2.2 'Print-URI' in [IPP-MOD].
1002
1003
1004
1005 5.3.8. resource-data-k-octets (integer(0:MAX))
1006
1007 REQUIRED - for IPP Printers to implement.
1008
1009 This attribute contains the size of associated Resource data (if
1010 any).
1011
1012 See 'Lazy Refresh' in section 5.3.7 'resource-data-uri' for IPP
1013 Printer behavior with respect to "resource-data-k-octets".
1014
1015 See section 5.3.6 "resource-data-present" in this document.
1016
1017
1018
1019 5.3.9. resource-data-compression (type3 keyword)
1020
1021 REQUIRED - for IPP Printers to implement.
1022
1023 This attribute identifies the compression of the associated Resource
1024
1025 Hastings, McDonald Expires 7 January 2001 [Page 18]
1026

1030 data (if any).

1031
1032 See section 4.4.32 'compression-supported' in [IPP-MOD] for standard
1033 keyword values.
1034

1035
1036
1037 5.3.10. resource-create-date-time (dateTime)

1038
1039 REQUIRED - for IPP Printers to implement.

1040
1041 This attribute indicates the date and time at which the Resource
1042 object instance was created.
1043

1044 Note: This time SHOULD reflect the actual 'build date' of the
1045 Resource data rather than simply the 'install date' on the IPP
1046 Printer, because this is more informative for the end user.
1047

1048 See section 4.4.30 'printer-current-time' in [IPP-MOD].
1049 See section 4.3.14.5 'date-time-at-creation' in [IPP-MOD].
1050

1051
1052
1053 5.3.11. resource-duration (integer(0:MAX))

1054
1055 REQUIRED - for IPP Printers to implement.

1056
1057 This attribute indicates length of the Resource object instance lease
1058 in seconds.
1059

1060 See section 5.4.6 "resource-create-time" in this document.
1061 See section 5.4.9 "resource-expiration-time" in this document.
1062

1063
1064
1065 5.3.12. resource-persistence (boolean)

1066
1067 REQUIRED - for IPP Printers to implement.

1068
1069 This attribute indicates whether or not this Resource object instance
1070 is persistent (preserved by the IPP Printer across power cycles).
1071

1072 A 'true' value specifies an infinite lease and supersedes
1073 "resource-duration" and "resource-expiration-time". A 'false' value
1074 specifies a finite lease and selects use of "resource-duration" and
1075 "resource-expiration-time".
1076

1077 See section 5.3.11 "resource-duration" in this document.
1078 See section 5.4.9 "resource-expiration-time" in this document.
1079

1087
1088
1089 5.4. Resource Description Attributes
1090

1091
1092
1093 5.4.1. resource-type (type2 keyword)
1094

1095 REQUIRED - for IPP Printers to implement.
1096

1097 This attribute identifies the type of this Resource object instance
1098 which determines additional Resource attributes specific to the named
1099 type.
1100

1101 The following standard keyword values are defined:
1102

1103 'driver': The Resource contains client print support files
1104 (e.g., a driver) for an IPP Client (see section 6 'Driver
1105 Resource Type' in this document) for this IPP Printer.
1106

1107
1108
1109 5.4.2. resource-name (name(127))
1110

1111 REQUIRED - for IPP Printers to implement.
1112

1113 This attribute is the human-readable name of the Resource. This name
1114 is more user-friendly than the integer "resource-id" attribute.
1115

1116 This name MUST be unique among Resources of the SAME "resource-type".
1117 IPP Printers MUST not allow Resource object instances of the SAME
1118 "resource-type" with duplicate "resource-name" values.
1119

1120 Note: This attribute has been specified as REQUIRED (unlike
1121 "job-name") in the interests of ease-of-use. IPP Printers are
1122 expected to implement large numbers of Resource objects and the
1123 guaranteed presence of the user-friendly name will benefit
1124 ease-of-use.
1125

1126 See section 4.3.5 'job-name' in [IPP-MOD].
1127

1128
1129
1130 5.4.3. resource-id (integer(1:MAX))
1131

1132 REQUIRED - for IPP Printers to implement.
1133

1134 This attribute contains the locally unique ID of the Resource. The
1135 IPP Printer, on creation of a new Resource (by means outside of this
1136 specification), generates an ID which identifies the new Resource on
1137 that Printer (but not globally). The zero '0' value is not included
1138

1141
1142 Internet Draft IPP Get Resource Operations 7 July 2000
1143
1144 to allow for compatibility with SNMP index values which also cannot
1145 be zero '0'.
1146
1147 See section 4.3.2 'job-id' in [IPP-MOD].
1148
1149
1150
1151 5.4.4. resource-printer-uri (uri)
1152
1153 REQUIRED - for IPP Printers to implement.
1154
1155 This attribute identifies the IPP Printer that hosts this Resource
1156 object instance.
1157
1158 See section 4.3.3 'job-printer-uri' in [IPP-MOD].
1159
1160
1161
1162 5.4.5. resource-create-user-name (name(MAX))
1163
1164 REQUIRED - for IPP Printers to implement.
1165
1166 This attribute contains the name of the end user that created this
1167 Resource object instance.
1168
1169 For factory-installed resources, "resource-create-user-name" MUST be
1170 set to the empty string to prevent namespace conflicts in end user
1171 networks.
1172
1173 See section 4.3.6 'job-originating-user-name' in [IPP-MOD].
1174
1175
1176
1177 5.4.6. resource-create-time (integer(0:MAX))
1178
1179 REQUIRED - for IPP Printers to implement.
1180
1181 This attribute indicates the time at which the Resource object
1182 instance was created.
1183
1184 Note: This time SHOULD reflect the actual 'build time' of the
1185 Resource data rather than simply the 'install time' on the IPP
1186 Printer, because this is more informative for the end user.
1187
1188 See section 4.4.29 'printer-up-time' in [IPP-MOD].
1189 See section 4.3.14.1 'time-at-creation' in [IPP-MOD].
1190
1191
1192
1193
1194
1195
1196 Hastings, McDonald Expires 7 January 2001 [Page 21]
1197

1201
1202
1203 5.4.7. resource-change-time (integer(0:MAX))

1204
1205 REQUIRED - for IPP Printers to implement.

1206
1207 This attribute indicates the time at which the Resource object
1208 instance was last changed.

1209
1210 See section 5.4.6 "resource-create-time" in this document.
1211 See section 4.4.29 'printer-up-time' in [IPP-MOD].

1212
1213
1214
1215 5.4.8. resource-refresh-time (integer(0:MAX))

1216
1217 REQUIRED - for IPP Printers to implement.

1218
1219 This attribute indicates the time at which the Resource object
1220 instance was last refreshed (i.e., a local copy of the Resource data
1221 was made).

1222
1223 See section 5.4.6 "resource-create-time" in this document.
1224 See section 4.4.29 'printer-up-time' in [IPP-MOD].

1225
1226
1227
1228 5.4.9. resource-expiration-time (integer(0:MAX))

1229
1230 REQUIRED - for IPP Printers to implement.

1231
1232 This attribute indicates the time at which the Resource object
1233 instance lease will expire.

1234
1235 See section 5.4.6 "resource-create-time" in this document.
1236 See section 5.3.11 "resource-duration" in this document.
1237 See section 4.4.29 'printer-up-time' in [IPP-MOD].
1238 See section 4.3.14.5 'date-time-at-creation' in [IPP-MOD].

1260 6. Driver Resource Type
1261
1262
1263
1264

1265 6.1. Table of Required Driver Resource Attributes
1266

1267 All IPP Printers that support Driver Resource objects MUST implement
1268 the following REQUIRED attributes defined in this specification (on
1269 the Driver Resource object or the Printer object):
1270

1271 Driver Resource Attribute	Driver Attribute Type
1272 Operation or Resource Group	
1273 Printer Attribute	Printer Attribute Type
1274 -----	-----
1275 driver-file-type	(type2 keyword)
1276 driver-file-type	[Resource group]
1277 driver-file-type-default	(type2 keyword)
1278 driver-file-type-supported	(1setOf type2 keyword)
1279	
1280 driver-file-name	(name(MAX))
1281 driver-file-name	[Resource group]
1282 [none]	
1283	
1284	

1285 6.2. Table of Optional Driver Resource Attributes
1286

1287 All IPP Printers that support Driver Resource objects MAY implement
1288 the following OPTIONAL attributes defined in this specification (on
1289 the Driver Resource object or the Printer object):
1290

1291 Driver Resource Attribute	Driver Attribute Type
1292 Operation or Resource Group	
1293 Printer Attribute	Printer Attribute Type
1294 -----	-----
1295 driver-charset	(1setOf charset)
1296 driver-charset	[Resource group]
1297 charset-configured	(charset)
1298 charset-supported	(1setOf charset)
1299	
1300 driver-natural-language	(1setOf naturalLanguage)
1301 driver-natural-language	[Resource group]
1302 natural-language-configured	(naturalLanguage)
1303 generated-natural-language-configured	(1setOf naturalLanguage)
1304	
1305	
1306	
1307	
1308	
1309	

1316
1317 6.3. Driver Resource Template Attributes
1318

1319
1320
1321 6.3.1. driver-charset (1setOf charset)
1322

1323 OPTIONAL - for IPP Printers to implement.
1324

1325 This attribute specifies the list of client charsets
1326 supported by the Driver Resource (when installed on the client system
1327
1328

1329
1330 6.3.2. driver-natural-language (1setOf naturalLanguage)
1331

1332 OPTIONAL - for IPP Printers to implement.
1333

1334 This attribute specifies the list of client natural languages
1335 supported by the Driver Resource (when installed on the client system
1336
1337

1338
1339 6.3.3. driver-file-type (type2 keyword)
1340

1341 REQUIRED - for IPP Printers to implement.
1342

1343 This attribute specifies the client file type of
1344 this Driver Resource (when installed on the client system).
1345

1346 The following standard keyword values are defined:
1347

1348 'none': The Driver Resource contains client print support files i
1349 unspecified (opaque) format.
1350

1351 'exec': The Driver Resource contains client print support files i
1352 native executable format of the operating system(s) specified in
1353 "resource-os-types" attribute, for example '.exe' on Microsoft sy
1354

1355 'gpd': The Driver Resource contains client print support files in
1356 Microsoft GPD format.
1357

1358 'java': The Driver Resource contains client print support files i
1359

1360 'ppd': The Driver Resource contains client print support files in
1361 Adobe PPD format.
1362

1363 'printcap': The Driver Resource contains client print support fil
1364 the UNIX 'printcap' format.
1365

1372
1373 'script': The Driver Resource contains client print support files
1374 native script format of the operating system(s) specified in the
1375 "resource-os-types" attribute, for example Bourne shell on UNIX s
1376 Note: This type may be ambiguous on some target operating system
1377

1378 'updf': The Driver Resource contains client print support files i
1379 (work-in-progress) PWG UPDF format.
1380

1381
1382
1383 6.3.4. driver-file-name (name(MAX))
1384

1385 REQUIRED - for IPP Printers to implement.
1386

1387 This attribute specifies the client file name of
1388 this Driver Resource (when installed on the client system)
1389 or the empty string (if none configured).
1390 If this Driver Resource contains multiple client print support files,
1391 then "driver-file-name" SHOULD specify an 'install directory path'.
1392
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1430
1431 7. Conformance Requirements
1432

1433
1434
1435 7.1. IPP Client Conformance Requirements
1436

1437 IPP Clients MUST supply the required operation attributes in Resource
1438 operations.
1439

1440
1441 7.2. IPP Printer Conformance Requirements
1442

1443
1444
1445 7.2.1. Resource Operations
1446

1447 All IPP Printers that support Resource objects MUST implement
1448 the following REQUIRED operations defined in this specification:
1449

1450 Resource Operation
1451 -----
1452 Get-Resources
1453 Get-Resource-Attributes
1454 Get-Resource-Data
1455

1486
1487
1488 7.2.2. Resource Attributes

1489
1490 See section 5.1 'Table of Required Resource Attributes' and section
1491 5.2 'Table of Optional Resource Attributes'.
1492

1493
1494
1495 7.2.3. Driver Resource Attributes

1496
1497 See section 6.1 'Table of Required Driver Resource Attributes' and
1498 section 6.2 'Table of Optional Driver Resource Attributes'.
1499

1544
1545 8. IANA Considerations

1546 See section 6 'IANA Considerations' in [IPP-MOD].
1547
1548
1549
1550

1551 9. Internationalization Considerations

1552
1553 This IPP Resource Objects and Get Resource Operations specification
1554 continues support for the internationalization in [IPP-MOD]
1555 attributes containing text strings and names.
1556

1557 See section 7 'Internationalization Considerations' in [IPP-MOD].
1558
1559
1560

1561 10. Security Considerations

1562
1563 This IPP Resource Objects and Get Resource Operations specification
1564 inherits the same security considerations for Resources as are
1565 specified for Jobs in [IPP-MOD].
1566

1567 See section 8 'Security Considerations' in [IPP-MOD].
1568
1569
1570

1571 11. Encodings of Additional Resource Tags

1572
1573 The section assigns values to new protocol tags as extensions to the
1574 encoding defined in [IPP-PRO].
1575

1576 The resource-attributes-tag delimits Resource Template Attributes Groups
1577 in requests and Resource Attributes Groups in responses.
1578

1579 Tag Value (Hex)	Tag Meaning
1580 -----	-----
1581 0x08	resource-attributes-tag
1582	
1583 0x1E	Get-Resource-Attributes operation
1584 0x1F	Get-Resource-Data operation
1585 0x20	Get-Resources operation
1586	
1587	
1588	

1589 12. References

1590
1591 See section 9 'References' in [IPP-MOD].
1592

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1594

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1606
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1608 ftp://ftp.isi.edu/in-notes/iana/assignments/operating-system-names.
1609

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1611

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1658
1659 14. Appendix A - Change History
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1661 [To be deleted before RFC publication]
1662

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1664
1665 14.1. 7 July 2000 - draft-ietf-ipp-get-resource-00.txt
1666
1667 initial version
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1672

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