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**Information technology -
Document Printing Application (DPA) -
Part 3: Management abstract service definition and procedures**

Draft International Standard 10175-3

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1 Information technology

2 Document Printing Application (DPA)

3 Part 3:

4 Management abstract service definitions and procedures

5 Section 1 - General

6 1 Scope

7 The Document Printing Application is one component of a coordinated set of facilities and standards needed to
8 satisfy the printing requirements of the modern distributed office. Together, the capabilities provided can enable
9 users to create and produce high-quality office documents in a consistent and unambiguous manner within a
10 distributed open systems environment.

11 The Document Printing Application Standard (ISO/IEC 10175) consists of three parts:

- 12 Part 1: Abstract service definitions and procedures
- 13 Part 2: Protocol specification
- 14 Part 3: Management abstract service definition and procedures

15 This part of ISO/IEC 10175 extends the facilities specified in ISO/IEC 10175-1 by adding the capability for
16 administrators and operators to manage and control printers, print servers and all other print objects; in addition, this
17 part specifies additional capabilities for a print client to control a print job. The text and specifications contained in
18 this part of ISO/IEC 10175 are derived from IEEE 1387.4 (POSIX) - System Administration Part 4 - Printing
19 Interfaces. In particular, this part of ISO/IEC 10175:

- 20 - specifies additional administrative functions and services that may be provided by Document Printing
21 Application servers;
- 22 - specifies the Document Printing Application abstract service for the additional administrative functions
23 using the principles established by the Abstract Service Definition Conventions (ISO/IEC 10021-3);
- 24 - specifies the requirements for conformance with the Document Printing Application for these additional
25 administrative functions.

26 See clause 1 of ISO/IEC 10175-1 for a more extensive description of the Document Printing Application.

27 2 Normative references

- 28 ISO/IEC 7498-1: 1994, *Information technology - Open Systems Interconnection -*
29 *Basic Reference Model: The Basic Model.*
- 30 ISO/IEC 7498-2: 1989, *Information processing systems - Open Systems Interconnection -*
31 *Basic Reference Model - Part 2: Security Architecture.*

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- 32 ISO/IEC 8824: 1990, *Information technology - Open Systems Interconnection - Specification of Abstract*
33 *Syntax Notation One (ASN.1).*
- 34 ISO/IEC 8825: 1990, *Information technology - Open Systems Interconnection - Specification of Basic*
35 *Encoding Rules for Abstract Syntax Notation One (ASN.1).*
- 36 ISO/IEC 10021-3: 1990, *Information technology - Text Communication - Message-Oriented Text Interchange*
37 *Systems (MOTIS)*
38 *- Part 3: Abstract Service Definition Conventions.*
- 39 IEEE 1387.4 / D8, *Draft Standard for Information Technology - POSIX System Administration - Part 4:-*
40 *Printing Interfaces, IEEE, October 1994.*

41 **3 Definitions**

42 For the purposes of this part of ISO/IEC 10175, the definitions given in ISO/IEC 10175-1 apply.

43 **4 Abbreviations**

44 For the purposes of this part of ISO/IEC 10175, the abbreviations given in ISO/IEC 10175-1 apply.

45 **5 Conventions**

46 For the purposes of this part of ISO/IEC 10175, the conventions given in ISO/IEC 10175-1 apply.

47 **Section 2 - DP management abstract service definition**

48 **6 DP abstract model**

49 For the purposes of this part of ISO/IEC 10175, the DP abstract model given in ISO/IEC 10175-1, clause 6, applies.
 50 The abstract operations defined in this part of ISO/IEC 10175 are all accessed through the DP-Administration port.

51 **7 Abstract association information**

52 For the purposes of this part of ISO/IEC 10175, the abstract association information given in ISO/IEC 10175-1,
 53 clause 7, applies; no additional requirements exist for this part of ISO/IEC 10175.

54 **8 Abstract operations**

55 This clause defines the following abstract-operations:

- 56 a) Clean
- 57 b) Control
- 58 c) Create
- 59 d) Delete
- 60 e) Disable
- 61 f) Enable
- 62 g) Pause
- 63 h) ResubmitJob
- 64 i) Resume
- 65 j) Set
- 66 k) Shutdown

67 Normally only an appropriately authorized administrator may use the above operations. However, this is a site
 68 and/or enterprise-specific policy decision, not mandated by this International Standard.

69 The table below lists each of the above abstract-operations and all of the abstract-operations of ISO-IEC 10175-1,
 70 and the object classes on which they operate.

abstract-operation	DPA Part	job	document	server	printer		all others
					logical	physical	
CancelJob	1	yes*					
Clean	3			yes		yes	
Control	3			yes		yes	
Create	3			unspecified	yes	yes	yes
Delete	3	yes	yes	unspecified	yes	yes	yes
Disable	3			yes	yes	yes	
Enable	3			yes	yes	yes	
InterruptJob	1	yes*					
ListObjectAttributes	1	yes	yes	yes	yes	yes	yes
ModifyJob	1	yes*					

Pause	3			yes		yes	
PauseJob	1	yes*					
Print	1	yes*					
PromoteJob	1	yes*					
ResubmitJob	3	yes		yes	yes	impl. option	
Resume	3			yes		yes	
ResumeJob	1	yes*					
Set	3	yes	yes	yes	yes	yes	yes
Shutdown	3			yes		impl. option	

71 NOTES

72 1 * Most abstract-operations utilize an **object-class** argument element to specify the class of the **object-**
 73 **instance** (or **object-identification**). However, many of the operations of ISO/IEC 10175-1 do not since they only
 74 operate on a single class, the job. Operations that do not utilize an **object-class** argument element are marked with an
 75 asterisk (*) in the above table.

76 2 In POSIX, multiple object instances may be specified, either as an explicit list of individual object instances, as an
 77 object instance that may contain wildcard characters, e.g. an asterisk (*), or as a combination of both methods.
 78 However, DPA abstract-operations may only be applied to a single **object-instance** at a time. Thus the print client
 79 must invoke a separate DPA operation for each **object-instance**. If the use of wildcard characters is supported by the
 80 print client, the print client shall invoke the specified abstract-operation on all objects of the specified **object-class**
 81 whose name matches the wildcard expansion. Support for wildcards is an implementation option.

82 3 This **Clean** operation and the **Delete** operation may operate asynchronously, i.e. these operations need not complete
 83 immediately before returning to the client, based on the state of the printer. However, although the **Create** operation
 84 may cause objects to be removed when **force-creation** is TRUE, the **Create** operation shall immediately create the
 85 new object. If the printer is not able to immediately complete the deletion of the existing object due to the state of the
 86 printer, the server shall rename the existing object so that the creation of the new object can complete.

87 **8.1 Common datatypes and values used in DP management abstract operations**

88 **8.1.1 Imported datatypes**

89 This part of ISO/IEC 10175 imports and uses the following datatypes defined in ISO/IEC 10175-1:

90 From ISO/IEC 10175-1.Annex B:

- 91 Attribute,
- 92 AttributeId,
- 93 CommonArguments,
- 94 ModifyOperator
- 95 ObjectIdentification,

- 96 AccessError,
- 97 AttributeError,
- 98 PrinterError,
- 99 SecurityError,
- 100 SelectionError,
- 101 ServiceError,
- 102 UpdateError

103 From ISO/IEC 10175-1.Annex C:

- 104 DistinguishedNameString.
- 105 JobIdentifier,
- 106 Message

107 In addition, the abstract-operations defined in this part of ISO/IEC 10175 employ the abstract service macros
 108 ABSTRACT-ERROR and ABSTRACT-OPERATION, defined in ISO/IEC 10021-3.

109 **8.1.2 Datatypes common for most DPA abstract operations**

110 **8.1.2.1 Common-arguments**

111 The argument of each of the abstract-operations defined in this part of ISO/IEC 10175 includes an optional element
 112 of type **CommonArguments**, imported from ISO/IEC 10175-1 Annex C, as indicated in 8.1.1, above. See ISO/IEC
 113 10175-1 clause 8.1.2 for specifications of the attributes that may be included in an instance of the
 114 **CommonArguments** type.

115 **8.1.2.2 Message**

116 The argument of each of the abstract-operations defined in this part of ISO/IEC 10175 includes an optional element
 117 of type **Message**, imported from ISO/IEC 10175-1 Annex C, as indicated in 8.1.1, above. When a client specifies a
 118 **Message** element in one of the abstract-operations defined in this part of ISO/IEC 10175, the server shall treat it in
 119 the manner specified in this subclause.

120 The server shall attach the specified message to the **object-instance** identified in the operation. The message string
 121 shall be a human-readable message which can be retrieved later by using the **ListObjectAttributes** operation.

122 If messages are specified in one locale and retrieved in another, a variety of results may occur depending on the
 123 message specification from the client locale and at the server locale. See the table below for different possible results
 124 to **message** at the server. See clause 8.1.2.3 in ISO/IEC 10175-1 for a description of **operation-locale**.

		if message at the server locale is:		
		unspecified	non-NULL string	NULL string
if message from the client locale is:				
unspecified	message at server remains unspecified	message at server remains unspecified	message at server remains the non-NULL string	message at server remains the NULL string
non-NULL string	message at server becomes the client non-NULL string	message at server changes to the client non-NULL string	message at server changes to the client non-NULL string	message at server changes to the client non-NULL string
NULL string	message at server becomes the NULL string	message at server changes to the NULL string	message at server changes to the NULL string	message at server remains the NULL string

125 **8.2 DP-User Port Abstract Operation Definitions**

126 There are no DP-User Port abstract-operations defined in this part of ISO/IEC 10175.

127 **8.3 DP-Administration Port Abstract-Operation Definitions**

128 Clients may use the abstract-operations described in the following clauses to administer and control the flow of print-
 129 jobs through printers, and to administer and control print objects. Specific print server implementations may limit
 130 usage of one or more of these abstract-operations to administrators with sufficient access rights, and/or may vary the
 131 facilities provided by a given abstract-operation depending upon the access rights assigned to the individual
 132 administrators served by the print server.

133 *Temporary NOTE - The abstract-operations defined in this part of ISO/IEC 10175 are extensions to the list of DP-*
 134 *Administration port abstract-operations defined in ISO/IEC 10175-1; future addenda to ISO/IEC 10175-1 will specify*
 135 *the relationships in detail.*

136 **8.3.1 Clean**

137 This abstract-operation allows an administrator to remove all jobs from the specified print server or printer.
 138 (Removal of jobs from logical printers is an implementation option.) When the Clean operation is invoked by an
 139 administrator with appropriate privileges, the server shall:

- 140 a) disable the object if it is enabled,
- 141 b) if the object is a physical printer, pause the printer to stop the printer from producing output (see **Pause**
 142 operation),
- 143 c) remove all jobs contained in or scheduled for that object,
- 144 d) restore the state of the object to what it was when the execution of the **Clean** operation began.

145 The server shall remove jobs that are being printed on the physical printer at the time the **Clean** operation is invoked
 146 in a manner that is consistent with the behavior of the **Delete** operation.

147 This operation may operate asynchronously, i.e. this operation need not complete immediately before returning,
 148 based on the state of the printer.

149 This abstract-operation is formally defined as follows:

```

150 Clean ::= ABSTRACT-OPERATION
151     ARGUMENT      CleanArgument
152     RESULT        CleanResult
153     ERRORS        { AccessError,
154                       SecurityError,
155                       ServiceError }
    
```

156 NOTE - Normally only an appropriately authorized administrator may clean a printer or server object. However, this is
 157 a site and/or enterprise-specific policy decision, not mandated by this International Standard.

158 **8.3.1.1 Clean-argument**

159 The argument of this abstract-operation is formally defined as follows:

```

160 CleanArgument ::= SEQUENCE {
161     object-class      [0] OBJECT IDENTIFIER,
162                       -- id-oc-server, id-oc-printer
163     object-instance [1] ObjectIdentification,
164                       -- choice depends on object class
165     message          [2] Message OPTIONAL,
166     common-arguments [3] CommonArguments OPTIONAL }
    
```

167 The following argument elements shall be supported by the server:

168 **object-class**

169 This argument element shall specify the object class of the **object-instance**. The **object-class** argument element
 170 shall be one of the following values: **id-oc-printer** or **id-oc-server**.

171 **object-instance**

172 This argument element shall specify the **object-instance** based on the value of the **object-class** argument element.
 173 The administrator shall specify one **object-instance** value associated with the **object-class**.

174 For each supported **object-class**, the server shall remove all jobs from the object specified by the **object-instance**
 175 identified by the **ObjectIdentification** element.

176 A print server shall either accept or reject a request to clean an **object-instance**. The print server shall return any
 177 attribute warnings or abstract-errors to the print client.

178 Each **object-instance** shall take one of the following forms:

object-class Specification	ObjectIdentification element	object-instance Values
id-oc-printer	simple-name	<p>Printer name representing a physical printer. The behavior of the Clean operation on a job that is currently printing shall be consistent with the behavior of the Delete operation on currently printing jobs. See clause 8.3.4 for a description of the Delete operation. Use of the Clean operation for a logical printer is not supported.</p> <p>NOTE 1 - As an example, if the printer is a physical printer, a server implementation shall delete all jobs that are currently printing on the specified physical printer, i.e. jobs that have their printers-assigned attribute set to the physical printer. If the printer is a logical printer, the server implementation shall reject the operation and return a clean-logical-printer-unsupported ServiceError.</p>
id-oc-server	simple-name	<p>Server name. Cleaning a print server shall cause all jobs to be removed (deleted) that have been submitted to it (to any of its supported printers). Therefore, all print jobs on all printers supported by the specified server shall be removed. The behavior of the Clean operation on a job that is currently printing shall be consistent with the behavior of the Delete operation on currently printing jobs. See clause 8.3.4 for a description of the Delete operation.</p> <p>NOTE 2 - As an example, a server implementation shall delete all jobs that it contains, including jobs that are currently being printed on a physical printer.</p>

179 **message**

180 See 8.1.2.

181 **common-arguments**

182 See clause 8.1.2 in ISO/IEC 10175-1 for a description of the **CommonArguments** type.

183 **8.3.1.2 Clean-result**

184 The result of this abstract-operation is formally defined as follows:

```
185     CleanResult ::= SEQUENCE {
186         object-status [0] SET OF Attribute OPTIONAL }
```

187 The server may return object-status attributes of the cleaned object.

188 **8.3.1.3 Clean Abstract-errors**

189 If the request fails, the server shall return one of the listed abstract-errors. The circumstances under which the server
 190 will return a particular abstract-error are defined in clause 8.4 of ISO/IEC 10175-1.

191 **8.3.2 Control**

192 This abstract-operation allows an administrator to perform a variety of operations on the specified print server or
 193 printer. The **operations** argument element contains an attribute for each operation to be performed by the **Control**
 194 operation. The operations that are currently supported by the **Control** operation are reset and tracing.

195 This abstract-operation is formally defined as follows:

```

196 Control ::= ABSTRACT-OPERATION
197     ARGUMENT      ControlArgument
198     RESULT        ControlResult
199     ERRORS        { AccessError,
200                   SecurityError,
201                   ServiceError }
    
```

202 NOTE - Normally only an appropriately authorized administrator may invoke the **Control** operation. However, this is
 203 a site and/or enterprise-specific policy decision, not mandated by this International Standard.

204 **8.3.2.1 Control-argument**

205 The argument of this abstract-operation is formally defined as follows:

```

206 ControlArgument ::= SEQUENCE {
207     object-class      [0] OBJECT IDENTIFIER,
208                     -- id-oc-server, id-oc-printer
209     object-instance  [1] ObjectIdentification,
210                     -- choice depends on object class
211     message          [2] Message OPTIONAL,
212     operations       [3] SEQUENCE OF Attribute,
213                     -- operands and parameters
214                     -- Current operations: reset and trace
215     common-arguments [4] CommonArguments OPTIONAL }
    
```

216 The following argument elements shall be supported by the server:

217 **object-class**

218 This argument element shall specify the object class of the **object-instance**. The **object-class** argument element
 219 shall be one of the following values: **id-oc-printer** or **id-oc-server**.

220 **object-instance**

221 This argument element shall specify the **object-instance** based on the value of the **object-class** argument element.
 222 The administrator shall specify one **object-instance** value associated with the **object-class**.

223 For each supported **object-class**, the server shall perform the **Control** operation defined by the **operations** argument
 224 element on the object specified by the **object-instance** identified by the **ObjectIdentification** element.

225 A print server shall either accept or reject a **Control** operation request on the **object-instance**. The print server shall
 226 return any attribute warnings or abstract-errors to the print client.

227 Each **object-instance** shall take one of the following forms:

object-class Specification	ObjectIdentification element	object-instance Values
-----------------------------------	-------------------------------------	-------------------------------

id-oc-printer	simple-name	<p>Printer name representing a physical printer.</p> <p>The behavior of the Control operation depends on the operations argument element, which may be one or more of the following attributes:</p> <ul style="list-style-type: none"> • reset: The server shall reset the physical printer according to the value of the reset attribute. The server may perform either a cold start (id-val-reset -power-cycle), a warm start (id-val-reset-to-nvram), or a reset to factory default conditions (id-val-reset-to-factory-default). Support for id-val-reset-to-factory-default is an implementation option. • trace-enable: The server shall enable tracing for the physical printer if the trace-enable attribute is TRUE, and shall disable tracing if the or trace-enable attribute is FALSE. <p>Use of the Control operation for a logical printer is not supported.</p>
id-oc-server	simple-name	<p>Server name.</p> <p>The behavior of the Control operation depends on the operations argument element, which may be one or more of the following attributes:</p> <ul style="list-style-type: none"> • reset: The server shall reset itself according to the value of the reset attribute. The server may perform either a cold start (id-val-reset -power-cycle), a warm start (id-val-reset-to-nvram), or a reset to factory default conditions (id-val-reset-to-factory-default). Support for id-val-reset-to-factory-default is an implementation option. • trace-enable: The server shall enable tracing for itself if the trace-enable attribute is TRUE, and shall disable tracing if the or trace-enable attribute is FALSE.

228 **message**

229 See 8.1.2.

230 **operations**

231 This argument element shall specify the attributes and values that describe the specific **Control** operation to be
 232 applied to the **object-instance**. The operations that are currently supported by the **Control** operation are described
 233 by the following attributes:

- 234 • **reset:** This operation resets the printer or print server at one of the following levels:
 235 **id-val-reset -power-cycle** for a cold start, **id-val-reset-to-nvram** for a warm start, or
 236 **id-val-reset-to-factory-default** for a reset to factory default conditions.

237 NOTE - For jobs that are being printed on the physical printer at the time the **Control** operation is invoked
 238 with the **reset** attribute, the results are unspecified.

- 239 • **trace-enable:** This operation enables tracing when the value of **trace-enable** is **TRUE** and
 240 disables tracing when the value of **trace-enable** is **FALSE**. When tracing is
 241 enabled, the printer or print server logs its execution activity to a file.

242 **common-arguments**

243 See clause 8.1.2 in ISO/IEC 10175-1 for a description of the **CommonArguments** type.

244 **8.3.2.2 Control-result**

245 The result of this abstract-operation is formally defined as follows:

```
246     ControlResult ::= SEQUENCE {
247         object-status [0] SET OF Attribute OPTIONAL }
```

248 The server may return object-status attributes of the cleaned object.

249 **8.3.2.3 Control Abstract-errors**

250 If the request fails, the server shall return one of the listed abstract-errors. The circumstances under which the server will return a particular abstract-error are defined in clause 8.4 of ISO/IEC 10175-1.

252 **8.3.3 Create**

253 This abstract-operation allows an administrator to create a printing object and set its attributes to the values specified within the argument elements. The **object-class** argument element shall indicate the class of the object. The server shall create the specified object instance as an object of the specified **object-class**. When the Create operation is invoked by an administrator with appropriate privileges, the server shall perform the following actions:

- 257 a) The server shall initialize the newly created object with the attributes specified by the **object-attributes** argument element. This has the same effect as issuing an equivalent **Set** operation. Note however, that some attributes may be settable with the **Create** operation, but may be restricted from further modification with the **Set** operation. See the **Set** operation description and the restrictions on attribute modification in clause 8.3.10. If the **copy-from** argument element is specified, the server creates a copy of the object specified by the **copy-from** argument element, and the attributes specified by the **object-attributes** argument element are applied subsequently.
- 264 b) If the print object already exists and the **force-creation** argument element is set to **FALSE**, the print server shall return the **object-already-exists SelectionError** for this operation. If the **force-creation** argument element is set to **TRUE**, the print server shall immediately delete the existing object and shall create the new object. If the printer is not able to immediately complete the deletion of the existing object due to the state of the printer, the server shall rename the existing object so that the creation of the new object can complete.
- 270 c) An **object-instance** created by the **Create** operation shall be permanent; the object is persistent, lasting across re-initialization of the print system, or any of its components.
- 272 d) When an **object-instance** of class **id-oc-printer** is created, the server shall place it in the **idle** state with the **enabled** attribute set to **FALSE** so print jobs cannot be accepted by the new printer. The administrator may then invoke the **Enable** operation to place the printer object in the **idle** state with the **enabled** attribute set to **TRUE**.
- 276 e) The server shall create an entry for the newly created **object-instance** in the name service, if such an entry is required by the server implementation.

278 This argument element shall cause the newly created **object-instance** to be a copy of the object specified by the **copy-from** argument element. The **Create** operation shall not operate on jobs or documents. It is implementation-defined whether the **Create** operation can cause the server to create print servers and how this is accomplished. Print servers may also be created by methods outside the scope of this International Standard. The **Create** operation shall operate on all other supported object classes.

283 This operation may operate asynchronously, i.e. this operation need not complete immediately before returning, based on the state of the printer.

285 This abstract-operation is formally defined as follows:

```

286 Create ::= ABSTRACT-OPERATION
287     ARGUMENT      CreateArgument
288     RESULT        CreateResult
289     ERRORS        { AccessError,
290                     SecurityError,
291                     SelectionError,
292                     ServiceError }

```

293 NOTE - Normally only an appropriately authorized administrator may create an object. However, this is a site and/or
 294 enterprise-specific policy decision, not mandated by this International Standard.

295 8.3.3.1 Create-argument

296 The argument of this abstract-operation is formally defined as follows:

```

297 CreateArgument ::= SEQUENCE {
298     object-class      [0] OBJECT IDENTIFIER, -- id-oc-xxx
299                     -- any id-oc-xxx, excluding job and document
300     object-instance  [1] ObjectIdentification,
301                     -- instance identifier depends on class
302     message          [2] Message OPTIONAL,
303     copy-from        [3] ObjectIdentification OPTIONAL,
304                     -- initial value object (IVO)
305     force-creation   [4] BOOLEAN DEFAULT FALSE,
306                     -- recreate if necessary
307     object-attributes [5] SET OF Attribute OPTIONAL,
308                     -- attributes of new object instance
309     common-arguments [6] CommonArguments OPTIONAL }

```

310 The following argument elements shall be supported by the server:

311 **object-class**

312 This argument element shall specify the object class of the **object-instance** to be created. The server implementation
 313 shall support a specific conformance level, as described in Annex E of ISO/IEC 10175-1, and that conformance level
 314 will determine the object classes and their attributes that the server supports. The following are the object classes
 315 defined in part 1 ISO/IEC 10175: **id-oc-auxiliary-sheet**, **id-oc-auxiliary-sheet-package**, **id-oc-delivery-method**,
 316 **id-oc-finishing**, **id-oc-font**, **id-oc-initial-value-document**, **id-oc-initial-value-job**, **id-oc-imposition**, **id-oc-medium**,
 317 **id-oc-output**, **id-oc-printer**, **id-oc-resource**, **id-oc-resource-context**, **id-oc-scheduler**, **id-oc-server**, or **id-oc-**
 318 **transfer-method**.

319 **object-instance**

320 This argument element shall specify the **object-instance** based on the value of the **object-class** argument element.
 321 The administrator shall specify one **object-instance** value associated with the **object-class**.

322 For each supported **object-class**, the server shall create the object specified by the **object-instance** identified by the
 323 **ObjectIdentification** element.

324 A print server shall either accept or reject a request to create an **object-instance**. The print server shall return any
 325 attribute warnings or abstract-errors to the print client.

326 Each **object-instance** shall take one of the following forms:

object-class Specification	ObjectIdentification element	object-instance Values
-----------------------------------	--	-------------------------------

id-oc-printer	simple-name	Printer name representing a logical or physical printer. If a printer object is created with the same name as a previously existing printer object which had jobs submitted to it, the new printer object shall also have those jobs submitted to it. Since the printer is created in the idle state with the enabled attribute set to FALSE , when the user issues a Enable operation on the newly (re)created printer, that printer shall begin printing the jobs that were submitted to it.
id-oc-server	simple-name	Server name. The server shall create a new server object in an unspecified manner. The ability to create a server object is implementation-defined.
id-oc-initial-value-document	name-or-oid	Initial-value-document name. Contains the attributes of the document class that the server may default when constructing a document object.
id-oc-initial-value-job	name-or-oid	Initial-value-job name. Contains the attributes of the job class that the server may default when constructing a job object.
id-oc-auxiliary-sheet	name-or-oid	Start sheet, end sheet, separator sheet name.
id-oc-auxiliary-sheet-package	name-or-oid	Predefined package of start sheets, end sheets, and separator sheets referenced by a single name.
id-oc-delivery-method	object-identifier	Delivery method identifier; such as for print job output.
id-oc-finishing	name-or-oid	Finishing method name; such as stapling, folding, or binding.
id-oc-font	font-reference	Font name.
id-oc-imposition	name-or-oid	Imposition method name; such as 2-up or 4-up.
id-oc-medium	name-or-oid	Media name; such as iso-a4-white or north-american-letter.
id-oc-output	object-identifier	Output method identifier; such as sorting or collating.
id-oc-resource	name-or-oid	Resource identifier; such as overlay or logo.
id-oc-resource-context	name-or-oid	Resource context name; encapsulate details about the server's environment that, when used with a resource name, uniquely identifies a resource in the environment of that server.
id-oc-scheduler	object-identifier	Scheduler name; determines the order in which jobs are sent to physical printer.
id-oc-transfer-method	object-identifier	Transfer method identifier; such as ftam , with-request , or push-by-client .

327 **message**

328 See 8.1.2.

329 **copy-from**

330 This argument element shall cause the newly created **object-instance** to be a copy of the object specified by the **copy-**
 331 **from** argument element. Attributes contained in that object shall be copied into the newly created object. The object
 332 may be located on any accessible print server.

333 The syntax and interpretation of the specified value is dependent on the **object-class** argument element in the same
 334 manner as **object-instance**.

335 If the optional server-name component of the name is omitted, the server shall interpret the value of the **copy-from**
 336 argument element as the name of an object on the same server as the object being created. If the optional server-
 337 name component of the name is included, the server shall request a list of the attributes of the *copy-from-object-*
 338 *instance* from the specified server and initialize the newly created object with those attributes. The ability of a server
 339 to copy an object from another server is an implementation option. A conforming server implementation not
 340 supporting this feature shall return an **unsupported-parameter-value ServiceError** when the administrator
 341 specifies a **server-name** that is not identical to the name of the server on which the object is being created.

342 **force-creation**

343 This argument element specifies whether or not the server shall be allowed to create a new print object when an
 344 object with the specified name already exists.

345 The **force-creation** argument element shall be one of the following values: **TRUE** or **FALSE**.

346 When an administrator with appropriate privileges specifies the **force-creation** argument element with value **TRUE**,
 347 the server shall create the specified print object, whether or not an object with the specified name already exists. If a
 348 print object with the specified name already exists, the server shall delete the existing print object before it creates the
 349 new print object. The server shall return no abstract-error or warning in this case. If the specified object does not
 350 exist, this argument element shall have no effect.

351 When an administrator with appropriate privileges specifies the **force-creation** argument element with value
 352 **FALSE**, the server shall create the specified print object only if an object with the specified name does not already
 353 exist. If a print object with the specified name does not already exist, the server shall create the new print. If a print
 354 object with the specified name does already exist, the server shall not create the new print object, but shall return the
 355 **object-already-exists SelectionError**.

356 **object-attributes**

357 This argument element shall specify the attributes and values with which the new **object-instance** shall be
 358 initialized. If the **copy-from** argument element is specified, the attributes specified by the **object-attributes**
 359 argument element are applied subsequently.

360 **common-arguments**

361 See clause 8.1.2 in ISO/IEC 10175-1 for a description of the **CommonArguments** type.

362 **8.3.3.2 Create-result**

363 The result of this abstract-operation is formally defined as follows:

```
364 CreateResult ::= SEQUENCE {
365     object-status [0] SET OF Attribute }
```

366 The server shall return the supported subset of the following **object-status** attributes of the created object depending
 367 on the **object-class**:

Object	object-class Specification	Attributes
Printer	id-oc-printer	id-att-printer-name id-att-printer-realization id-att-printer-state id-att-availability id-att-associated-server id-att-printer-locations id-att-printer-associated-printers id-att-scheduler-ready
Server	id-oc-server	id-att-server-name id-att-server-state id-att-availability

		id-att-logical-printers-supported id-att-physical-printers-supported
Medium	id-oc-medium	id-att-medium-identifier id-att-associated-server id-att-medium-realization id-att-medium-type id-att-medium-associated-media id-att-medium-size id-att-medium-dimensions id-att-medium-sides id-att-medium-color
Imposition	id-oc-imposition	id-att-imposition-identifier id-att-associated-server id-att-imposition-specification id-att-number-up
Initial-value-job	id-oc-initial-value-job	id-att-initial-value-job-identifier id-att-associated-server id-att-logical-printers-ready id-att-physical-printers-ready id-att-printer-locations-requested id-att-printer-models-requested id-att-job-retention-period
Initial-value-document	id-oc-initial-value-document	id-att-initial-value-document-identifier id-att-associated-server id-att-logical-printers-ready id-att-physical-printers-ready id-att-copy-count id-att-sides id-att-document-format
Font	id-oc-font	id-att-font-identifier id-att-associated-server id-att-file-reference
Auxiliary-sheet	id-oc-auxiliary-sheet	id-att-auxiliary-sheet-identifier id-att-auxiliary-sheet-medium id-att-associated-server
Auxiliary-sheet-package	id-oc-auxiliary-sheet-package	id-att-auxiliary-sheet-package-identifier id-att-associated-server
Transfer-method	id-oc-transfer-method	id-att-transfer-method-identifier id-att-transfer-method-type id-att-document-reference-type id-att-associated-server
Resource	id-oc-resource	id-att-resource-name id-att-resource-type id-att-associated-server id-att-file-reference
Resource-context	id-oc-resource-context	id-att-resource-context-identifier id-att-context-address id-att-associated-server
Delivery-method	id-oc-delivery-method	id-att-delivery-method-identifier id-att-associated-server
Finishing	id-oc-finishing	id-att-finishing-identification

		id-att-finishing-realization id-att-associated-server id-att-finishing-specification id-att-finishing-associated-finishings
Output	id-oc-output	id-att-output-identifier id-att-associated-server
Scheduler	id-oc-scheduler	id-att-scheduler-identifier id-att-associated-server

368 8.3.3.3 Create Abstract-errors

369 If the request fails, the server shall return one of the listed abstract-errors. The circumstances under which the server
370 will return a particular abstract-error are defined in clause 8.4 of ISO/IEC 10175-1.

371 8.3.4 Delete

372 This abstract-operation allows an administrator to delete printing objects. The **object-class** argument element shall
373 indicate the class of the object. When the Delete operation is invoked by an administrator with appropriate
374 privileges, the server shall perform the following actions:

- 375 a) The server shall disable printers before deleting them.
- 376 b) The server shall delete the specified print object(s) from the print system.
- 377 c) The server shall delete the print object entry in the name service, if an entry exists and is required by
378 the server implementation.
- 379 d) The server shall delete a currently printing job, as soon as the printer technology allows it to be deleted,
380 in an implementation-defined manner.

381 It is implementation-defined whether the **Delete** operation can delete print servers and how this is accomplished.

382 This operation may operate asynchronously, i.e. this operation need not complete immediately before returning based
383 on the state of the printer.

384 This abstract-operation is formally defined as follows:

```

385 Delete ::= ABSTRACT-OPERATION
386     ARGUMENT      DeleteArgument
387     RESULT        DeleteResult
388     ERRORS        { AccessError,
389                     SecurityError,
390                     ServiceError,
391                     UpdateError }

```

392 NOTE - Normally only an appropriately authorized administrator may delete an object. However, this is a site and/or
393 enterprise-specific policy decision, not mandated by this International Standard.

394 8.3.4.1 Delete-argument

395 The argument of this abstract-operation is formally defined as follows:

```

396 DeleteArgument ::= SEQUENCE {
397     object-class      [0] OBJECT IDENTIFIER,
398                       -- any id-oc, including job and server
399     object-instance [1] ObjectIdentification,
400                       -- choice depends on class
401     message          [2] Message OPTIONAL,
402     common-arguments [3] CommonArguments OPTIONAL }

```

403 The following argument elements shall be supported by the server:

404 **object-class**

405 This argument element shall specify the object class of the **object-instance** to be deleted. The **object-class** argument
 406 element shall be one of the following values: **id-oc-auxiliary-sheet**, **id-oc-auxiliary-sheet-package**, **id-oc-delivery-**
 407 **method**, **id-oc-document**, **id-oc-finishing**, **id-oc-font**, **id-oc-initial-value-document**, **id-oc-initial-value-job**, **id-oc-**
 408 **imposition**, **id-oc-job**, **id-oc-medium**, **id-oc-output**, **id-oc-printer**, **id-oc-resource**, **id-oc-resource-context**, **id-oc-**
 409 **scheduler**, or **id-oc-transfer-method**.

410 **object-instance**

411 This argument element shall specify the **object-instance** based on the value of the **object-class** argument element.
 412 The administrator shall specify one **object-instance** value associated with the **object-class**.

413 For each supported **object-class**, the server shall immediately delete the object specified by the **object-instance**
 414 identified by the **ObjectIdentification** element.

415 A print server shall either accept or reject a request to delete an **object-instance**. The print server shall return any
 416 attribute warnings or abstract-errors to the print client.

417 Each **object-instance** shall take one of the following forms:

object-class Specification	ObjectIdentification element	object-instance Values
id-oc-job	job-identifier	Global job identifier. If the job is not printing, the server shall immediately delete the job object, and all of its contained documents. The server shall delete a currently printing job as soon as the printer technology allows it to be deleted.
id-oc-document	document-identifier	Document identifier. The document sequence numbers of subsequent documents shall remain unchanged. If the last (or only) document in a multi-document print job is removed, the server shall delete the entire print job. The server shall delete a currently printing document as soon as the printer technology allows it to be deleted.
id-oc-printer	simple-name	Printer name representing a logical or physical printer. The server shall disable a printer before deleting it. See the Disable operation description in clause 8.3.5. The server shall stop printing any currently printing job on the printer, as soon as the printer technology allows it to be stopped, in an unspecified manner. Any print job submitted to print on a deleted printer shall remain in its current state, submitted to that printer, until such time as the printer object is recreated or the job is resubmitted to another printer. NOTE 1 - As an example, if the printer is a physical printer, a server implementation may wait for the jobs to complete or may require that the administrator first clean the printer of all of its jobs. See the Clean operation description in clause 8.3.1 Thus, if the physical printer contains jobs, then the server may reject the operation and

		<p>return the deletion-not-possible UpdateError to the print client. If the physical printer does not contain jobs, then the server may proceed with the Delete operation and remove the physical printer. If the deleted physical printer was the only one specified in the physical-printers-requested job attribute, and the physical-printers-requested attribute was compulsory, i.e. not listed in the non-compulsory-attributes attribute, then the server shall put the job in the held state with the on-request-resources-required attribute containing the physical-printers-requested attribute. Alternatively, if the deleted physical printer was again the only one specified in the physical-printers-requested job attribute, but the physical-printers-requested attribute was listed in the non-compulsory-attributes attribute, then the physical-printers-requested job attribute shall be added to the ignored-attributes attribute and the job shall remain in the print system and shall be reassigned to another physical printer. If the printer is a logical printer, the server implementation shall delete the logical printer. Once the logical printer has been deleted, the following server and printer attributes shall be updated to reflect this change: logical-printers-supported, logical-printers-ready, and printer-associated-printers.</p>
id-oc-server	simple-name	<p>Server name.</p> <p>The server shall immediately delete the server object in an unspecified manner. The ability to delete a server object is implementation-defined.</p> <p>NOTE 2 - As an example, a server implementation may require that the administrator first clean the server of all of its jobs. See the Clean operation description in clause 8.3.1. Thus, if the server contains jobs, then the server may reject the operation and return the deletion-not-possible UpdateError to the print client. If the server does not contain jobs, then it may proceed with the Delete operation.</p>
id-oc-initial-value-document	name-or-oid	Initial-value-document name. Contains the attributes of the document class that the server may default when constructing a document object.
id-oc-initial-value-job	name-or-oid	Initial-value-job name. Contains the attributes of the job class that the server may default when constructing a job object.
id-oc-auxiliary-sheet	name-or-oid	Start sheet, end sheet, separator sheet name.
id-oc-auxiliary-sheet-package	name-or-oid	Predefined package of start sheets, end sheets, and separator sheets referenced by a single name.
id-oc-delivery-method	object-identifier	Delivery method identifier; such as for print job output.

id-oc-finishing	name-or-oid	Finishing method name; such as stapling, folding, or binding.
id-oc-font	font-reference	Font name.
id-oc-imposition	name-or-oid	Imposition method name; such as 2-up or 4-up.
id-oc-medium	name-or-oid	Media name; such as iso-a4-white or north-american-letter.
id-oc-output	object-identifier	Output method identifier; such as sorting or collating.
id-oc-resource	name-or-oid	Resource identifier; such as overlay or logo.
id-oc-resource-context	name-or-oid	Resource context name; encapsulate details about the server's environment that, when used with a resource name, uniquely identifies a resource in the environment of that server.
id-oc-scheduler	object-identifier	Scheduler name; determines the order in which jobs are sent to physical printer.
id-oc-transfer-method	object-identifier	Transfer method identifier; such as ftam , with-request , or push-by-client .

418 **message**

419 See 8.1.2.

420 **common-arguments**

421 See clause 8.1.2 in ISO/IEC 10175-1 for a description of the **CommonArguments** type.

422 **8.3.4.2 Delete-result**

423 The result of this abstract-operation is formally defined as follows:

```
424     DeleteResult ::= SEQUENCE {
425         object-status    [0] SET OF Attribute OPTIONAL }
```

426 No specific set of attributes are required to be returned.

427 **8.3.4.3 Delete Abstract-errors**

428 If the request fails, the server shall return one of the listed abstract-errors. The circumstances under which the server will return a particular abstract-error are defined in clause 8.4 of ISO/IEC 10175-1.

430 **8.3.5 Disable**

431 This abstract-operation allows an administrator to disable the acceptance of new print jobs (**Print**, **ResubmitJob**, or **InterruptJob** operations) on the specified print server or printer. A disabled print server or printer shall continue to accept other operations defined in this International Standard.

434 Any print job that had previously been submitted to a printer that is now disabled shall be unaffected. Any currently printing job on a printer that is disabled shall continue printing to completion.

436 An administrator with appropriate privileges shall use the **Enable** operation to enable acceptance of print jobs on a specified server or printer.

438 This abstract-operation is formally defined as follows:

```
439     Disable ::= ABSTRACT-OPERATION
440         ARGUMENT      DisableArgument
441         RESULT        DisableResult
442         ERRORS        { AccessError,
443                         SecurityError,
444                         ServiceError }
```

445 NOTE - Normally only an appropriately authorized administrator may disable an object. However, this is a site and/or
 446 enterprise-specific policy decision, not mandated by this International Standard.

447 **8.3.5.1 Disable-argument**

448 The argument of this abstract-operation is formally defined as follows:

```

449 DisableArgument ::= SEQUENCE {
450     object-class      [0] OBJECT IDENTIFIER,
451                     -- id-oc-server, -id-oc-printer
452     object-instance  [1] ObjectIdentification,
453                     -- choice depends on class
454     message          [2] Message OPTIONAL,
455                     -- value of id-att-server-message,
456                     -- id-att-printer-message
457     common-arguments [3] CommonArguments OPTIONAL }
    
```

458 The following argument elements shall be supported by the server:

459 **object-class**

460 This argument element shall specify the object class of the **object-instance**. The **object-class** argument shall be one
 461 of the following values: **id-oc printer** or **id-oc-server**.

462 **object-instance**

463 This argument element shall specify the **object-instance** based on the value of the **object-class** argument element.
 464 The administrator shall specify one **object-instance** value associated with the **object-class**.

465 For each supported **object-class**, the server shall disable the object specified by the **object-instance** identified by the
 466 **ObjectIdentification** element.

467 A print server shall either accept or reject a request to disable a printer or server. The print server shall return any
 468 attribute warnings or abstract-errors to the print client.

469 Each **object-instance** shall take one of the following forms:

object-class Specification	ObjectIdentification element	object-instance Values
id-oc-printer	simple-name	Printer name representing a logical or physical printer. For both logical and physical printers, the print server shall stop accepting new print job requests (from the Print , ResubmitJob , and InterruptJob operations) on the specified printer. If the printer is a physical printer, it shall finish printing any jobs that are currently printing on that physical printer.
id-oc-server	simple-name	Server name. After a Disable operation is issued, the print server shall reject all new print requests, i.e. shall reject the Print , ResubmitJob , or InterruptJob operations. The print server shall continue to accept requests from other operations defined in this International Standard, such as ListObjectAttributes , CancelJob , or ModifyJob .

470 **message**

471 See 8.1.2.

472 **common-arguments**

473 See clause 8.1.2 in ISO/IEC 10175-1 for a description of the **CommonArguments** type.

474 **8.3.5.2 Disable-result**

475 The result of this abstract-operation is formally defined as follows:

```
476     DisableResult ::= SEQUENCE {
477         object-status    [0] SET OF Attribute OPTIONAL }
```

478 The server may return object-status attributes of the disabled object.

479 **8.3.5.3 Disable Abstract-errors**

480 If the request fails, the server shall return one of the listed abstract-errors. The circumstances under which the server will return a particular abstract-error are defined in clause 8.4 of ISO/IEC 10175-1.

482 **8.3.6 Enable**

483 This abstract-operation allows an administrator to enable the acceptance of new print jobs (**Print**, **ResubmitJob**, or **InterruptJob** operations) on the specified print server or printer. Any jobs that had previously been submitted to the print server or printer shall continue unaffected.

486 An administrator with appropriate privileges shall use the **Disable** operation to disable acceptance of new print jobs on a specified server or printer.

488 This abstract-operation is formally defined as follows:

```
489     Enable ::= ABSTRACT-OPERATION
490         ARGUMENT      EnableArgument
491         RESULT        EnableResult
492         ERRORS        { AccessError,
493                         SecurityError,
494                         ServiceError }
```

495 NOTE - Normally only an appropriately authorized administrator may enable an object. However, this is a site and/or enterprise-specific policy decision, not mandated by this International Standard.

497 **8.3.6.1 Enable-argument**

498 The argument of this abstract-operation is formally defined as follows:

```
499     EnableArgument ::= SEQUENCE {
500         object-class    [0] OBJECT IDENTIFIER,
501                         -- id-oc-server, -id-oc-printer
502         object-instance [1] ObjectIdentification,
503                         -- choice depends on class
504         message         [2] Message OPTIONAL,
505                         -- value of id-att-server-message,
506                         -- id-att-printer-message
507         common-arguments [3] CommonArguments OPTIONAL }
```

508 The following argument elements shall be supported by the server:

509 **object-class**

510 This argument element shall specify the object class of the **object-instance**. The **object-class** argument shall be one of the following values: **id-oc-printer** or **id-oc-server**.

512 **object-instance**

513 This argument element shall specify the **object-instance** based on the value of the **object-class** argument element.
 514 The administrator shall specify one **object-instance** value associated with the **object-class**.

515 For each supported **object-class**, the server shall enable the object specified by the **object-instance** identified by the
 516 **ObjectIdentification** element.

517 A print server shall either accept or reject a request to enable a printer or server. The print server shall return any
 518 attribute warnings or abstract-errors to the print client.

519 Each **object-instance** shall take one of the following forms:

object-class Specification	ObjectIdentification element	object-instance Values
id-oc-printer	simple-name	Printer name representing a logical or physical printer. If the printer is a logical printer, the print server shall resume accepting new print job requests for that logical printer. If the printer is a physical printer, the print server shall resume accepting new print jobs and submitting jobs to that physical printer.
id-oc-server	simple-name	Server name. After an Enable operation is issued, the print server shall accept valid new print requests from the Print , ResubmitJob , or InterruptJob operations.

520 **message**

521 See 8.1.2.

522 **common-arguments**

523 See clause 8.1.2 in ISO/IEC 10175-1 for a description of the **CommonArguments** type.

524 8.3.6.2 Enable-result

525 The result of this abstract-operation is formally defined as follows:

```
526 EnableResult ::= SEQUENCE {
527     object-status [0] SET OF Attribute OPTIONAL }
```

528 The server may return object-status attributes of the enabled object.

529 8.3.6.3 Enable Abstract-errors

530 If the request fails, the server shall return one of the listed abstract-errors. The circumstances under which the server
 531 will return a particular abstract-error are defined in clause 8.4 of ISO/IEC 10175-1.

532 8.3.7 Pause

533 This abstract-operation allows an administrator to pause a print server or a printer. An administrator with
 534 appropriate privileges shall use the **Resume** operation to resume the paused printer or server.

535 This abstract-operation is formally defined as follows:

```

536 Pause ::= ABSTRACT-OPERATION
537     ARGUMENT      PauseArgument
538     RESULT        PauseResult
539     ERRORS        { AccessError,
540                     AttributeError,
541                     SecurityError,
542                     SelectionError,
543                     ServiceError }

```

544 NOTE - Normally only an appropriately authorized administrator may pause an object. However, this is a site and/or
545 enterprise-specific policy decision, not mandated by this International Standard.

546 **8.3.7.1 Pause-argument**

547 The argument of this abstract-operation is formally defined as follows:

```

548 PauseArgument ::= SEQUENCE {
549     object-class      [0] OBJECT IDENTIFIER,
550                       -- id-oc-printer, id-oc-server
551     object-identification [1] ObjectIdentification,
552     message           [2] Message OPTIONAL,
553                       -- value of id-att-printer-message,
554                       -- id-att-server-message, id-att-message
555     common-arguments  [3] CommonArguments OPTIONAL }

```

556 The following argument elements shall be supported by the server:

557 **object-class**

558 This argument element shall specify the object class of the **object-identification**. The **object-class** argument shall be
559 one of the following values: **id-oc-printer** or **id-oc-server**.

560 **object-identification**

561 This argument element shall specify the **object-identification** based on the value of the **object-class** argument
562 element. The administrator shall specify one **object-identification** value associated with the **object-class**.

563 For each supported **object-class**, the server shall pause the object specified by the **object-identification** identified by
564 the **ObjectIdentification** element.

565 A print server shall either accept or reject a request to pause an **object-identification**. The print server shall return
566 any attribute warnings or abstract-errors to the print client.

567 Each **object-identification** shall take one of the following forms:

object-class Specification	ObjectIdentification element	object-identification Values
id-oc-printer	simple-name	Printer name representing a physical printer. If a job is currently processing or printing the server shall: a) stop printing the job at an unspecified pausable point, b) change the printer's printer-state to paused . c) change the job's job-state-of-printers-assigned to paused . Any job that was currently printing is left with a job-state of processing or printing , and still assigned to that printer.

		<p>Use of the Pause and Resume operations for a logical printer is not supported.</p> <p>NOTE - A server implementation may treat the paused state as a stronger pause than the job-start-wait, job-end-wait, and job-password-wait states, since for the other pause states operator actions instead of the Resume operation may cause the printer to resume printing. Thus an administrator may invoke the Pause operation when the printer is already paused for a different reason, thus requiring the administrator to invoke the Resume operation only once to resume printing. Administrators may prefer this at a time when they do not want the printer to resume printing automatically. Regardless of the reason for the printer to be paused, the administrator need only issue one Resume operation to resume printing.</p>
id-oc-server	simple-name	<p>Server name.</p> <p>When pausing a server, the server shall:</p> <ol style="list-style-type: none"> stop distributing print jobs to physical printers (this means print jobs that are currently in the pending job state shall be left in that state), and change the server-state to on-request, <p>All other server operations shall be unaffected.</p>

568 **message**

569 See 8.1.2.

570 **common-arguments**

571 See clause 8.1.2 in ISO/IEC 10175-1 for a description of the **CommonArguments** type.

572 8.3.7.2 Pause-result

573 The result of this abstract-operation is formally defined as follows:

```

574     PauseResult ::= SEQUENCE {
575         affected-job-identifier [0] JobIdentifier OPTIONAL,
576                                 --returned if a job was printing on the
577                                 --printer being paused
578         paused-object-status    [1] SET OF Attribute OPTIONAL }

```

579 The server may return object-status attributes of the paused object.

580 8.3.7.3 Pause Abstract-errors

581 If the request fails, the server shall return one of the listed abstract-errors. The circumstances under which the server will return a particular abstract-error are defined in clause 8.4 of ISO/IEC 10175-1.

583 8.3.8 Resubmit-job

584 This abstract-operation allows an administrator to request that print jobs be resubmitted by a print server to the specified target printer. The resubmit-job request may specify one particular job, or all jobs that have been submitted to a particular printer or server, but which have not yet begun printing.

587 Accounting information for each job submission shall be extracted and reset after the job has finished. When
 588 **ResubmitJob** is called, the values are set to zero for the new submission. Pertinent job attributes are as follows:
 589 **Job-copies-completed, Pages-completed, Impressions-completed, Media-sheets-completed, Octets-completed,**
 590 **Total-job-octets, and Processing-time.**

591 If a particular job is currently printing, the print server shall reject a request to resubmit that job, and the print server
 592 shall return the **resubmit-job-not-possible UpdateError** to the print client.

593 Both the new printer and the new print server can be the same as, or different from, the original printer and print
 594 server. If the new print server is different from the old print server, the old print server shall resubmit the print job to
 595 the new print server. The resubmission shall contain all of the original job attributes and any attributes that the old
 596 print server had defaulted. This allows the new print job to be as similar to the original print job as possible.

597 if the job(s) is resubmitted to a different print server, the old print server shall act as a temporary client, using the
 598 Print abstract-operation to transfer each component of the job(s) to the new print server. If the resubmitted job is to
 599 remain on the original server, the mechanism for resubmission is implementation-specific.

600 If a print job resubmission request is accepted, the accepting print server shall assign a new job identifier and return
 601 the new identifier to the submitting print server (which may or may not be the original print server). The old print
 602 server shall retain the old instance of the print job until the **job-retention-period** expires, or the job is deleted by
 603 some other means; the old job identifier remains valid until the original job exits the completed state.

604 For each job that was resubmitted, all administrators requesting notification of the resubmit job event in the job's
 605 **notification-profile** attribute shall receive said notification which shall include the old and new job identifier.

606 If the new server indicates that specified compulsory attributes or attribute values are not supported, it shall return
 607 the **unsupported-attribute-type AttributeError** or the **unsupported-attribute-value AttributeError**, respectively,
 608 to the print client. If the new server does not accept the job for any other reason, it shall return the appropriate
 609 abstract-error to the print client. The job shall remain on its original printer.

610 This abstract-operation is formally defined as follows:

```

611     ResubmitJob ::= ABSTRACT-OPERATION
612         ARGUMENT      ResubmitJobArgument
613         RESULT        ResubmitJobResult
614         ERRORS        { AccessError,
615                         AttributeError,
616                         PrinterError,
617                         SecurityError,
618                         SelectionError,
619                         ServiceError,
620                         UpdateError }
    
```

621 NOTE - Normally only an appropriately authorized administrator or operator can resubmit a job. However, this is a site
 622 and/or enterprise-specific policy decision, not mandated by this International Standard.

623 8.3.8.1 Resubmit-job-argument

624 The argument of this abstract-operation is formally defined as follows:

```

625     ResubmitJobArgument ::= SEQUENCE {
626         object-class      [0] OBJECT IDENTIFIER,
627                         -- id-oc-job, id-oc-printer,
628                         -- id-oc-server
629         object-identification [1] ObjectIdentification,
630         printer             [2] DistinguishedNameString,
631         message             [3] Message OPTIONAL,
632         common-arguments   [4] CommonArguments OPTIONAL }
    
```

633 The following argument elements shall be supported by the server:

634 **object-class**

635 This argument element shall specify the object class of the **object-identification**. The **object-class** argument shall be
636 one of the following values: **id-oc-job**, **id-oc-printer**, or **id-oc-server**

637 **object-identification**

638 This argument element shall specify the **object-identification** based on the value of the **object-class** argument
639 element.

640 For each supported **object-class**, the server shall resubmit the specified print jobs to the printer specified by the
641 **printer** argument element. The specified jobs are those associated with the object specified by the **object-**
642 **identification** identified by the **ObjectIdentification** element.

643 A specified job that is currently printing shall not be resubmitted, and the **resubmit-job-not-possible UpdateError**
644 shall be returned to the print client. Any jobs currently printing on a specified printer or server shall not be
645 resubmitted, but no abstract-error shall be returned to the print client. A job that is not accepted to print on the
646 printer specified by the **printer** argument element shall not be resubmitted, and no abstract-error shall be returned to
647 the print client.

648 Each **object-identification** shall take one of the following forms:

object-class Specification	ObjectIdentification element	object-identification Values
id-oc-job	job-identifier	Global job identifier. The server shall resubmit only the specified print job. If the specified job is currently printing, the server shall return the resubmit-job-not-possible UpdateError to the print client.
id-oc-printer	simple-name	Printer name representing a logical or physical printer. The server shall resubmit all currently submitted print jobs for the specified printer. The currently printing job, if any, on the specified printer shall not be resubmitted, and the print server shall not return an abstract-error to the print client.
id-oc-server	simple-name	Server name. The server shall resubmit all currently submitted print jobs for all printers that it supports. Any currently printing jobs on any supported printer shall not be resubmitted, and the print server shall not return an abstract-error to the print client.

649 **printer**

650 This argument element shall specify a single printer name to which the specified print jobs are to be resubmitted.

651 **message**

652 See 8.1.2.

653 **common-arguments**

654 See clause 8.1.2 in ISO/IEC 10175-1 for a description of the **CommonArguments** type.

655 **8.3.8.2 Resubmit-job-result**

656 The result of this abstract-operation is formally defined as follows:

```

657 ResubmitJobResult ::= SEQUENCE {
658     result-set      [0] SEQUENCE OF ObjectStatus }
659                 -- one result-set for each job resubmitted
660                 -- (or for each job attempted to be resubmitted)
661
662 ObjectStatus ::= SEQUENCE {
663     object-status [0] SET OF Attribute OPTIONAL }
664                 -- job-identifier and new-job-identifier shall be
665                 -- returned at least. For any jobs that could not
666                 -- be resubmitted, the new-job-identifier attribute
667                 -- shall be omitted as the only error indication.

```

668 The server shall at least return the following job-status attributes of the resubmitted job:

Object	object-class Specification	Attributes
Job	id-oc-job	new-job-identifier (only if successfully resubmitted) job-identifier

669 For each job that is successfully resubmitted to the same server or another server, both the new-job-identifier and the
670 job-identifier attributes shall be returned. For each job that is not resubmitted successfully, only the job-identifier
671 attribute shall be returned.

672 When more than one job is specified, as may be the case when the **object-identification** argument element is of
673 **object-class id-oc-printer** or **id-oc-server**, the absence of the new-job-identifier attribute is the only error indication
674 that the print client receives.

675 *Temporary note -The ObjectStatus type should probably include a SEQUENCE OF PrintResult in order to capture the*
676 *status of the individual print requests that comprise each resubmitted job. In addition, the syntax of*
677 *ResubmitJobArgument and ResubmitJobResult should probably include a continuation-context in order that the*
678 *ResubmitJob abstract-operation can operate asynchronously in the same manner as the ListObjectAttributes abstract-*
679 *operation.*

680 8.3.8.3 Resubmit-job Abstract-errors

681 If the request fails, the server shall return one of the listed abstract-errors. The circumstances under which the server
682 will return a particular abstract-error are defined in clause 8.4 of ISO/IEC 10175-1.

683 8.3.9 Resume

684 This abstract-operation allows an administrator to resume a paused print server or a paused printer.

685 An administrator with appropriate privileges shall use the **Pause** operation to pause the printer and server.

686 This abstract-operation is formally defined as follows:

```

687 Resume ::= ABSTRACT-OPERATION
688     ARGUMENT      ResumeArgument
689     RESULT        ResumeResult
690     ERRORS        { AccessError,
691                   AttributeError,
692                   SecurityError,
693                   SelectionError,
694                   ServiceError }

```

695 NOTE - Normally only an appropriately authorized administrator may resume an object. However, this is a site and/or
696 enterprise-specific policy decision, not mandated by this International Standard.

697 **8.3.9.1 Resume-argument**

698 The argument of this abstract-operation is formally defined as follows:

```

699     ResumeArgument ::= SEQUENCE {
700         object-class          [0] OBJECT IDENTIFIER,
701                                 -- id-oc-printer, id-oc-server
702         object-identification [1] ObjectIdentification,
703         message               [2] Message OPTIONAL,
704                                 -- value of id-att-printer-message,
705                                 -- id-att-server-message, id-att-message
706         common-arguments     [3] CommonArguments OPTIONAL }

```

707 The following argument elements shall be supported by the server:

708 **object-class**709 This argument element shall specify the object class of the **object-identification**. The **object-class** argument shall be one of the following values: **id-oc-printer** or **id-oc-server**.711 **object-identification**712 This argument element shall specify the **object-identification** based on the value of the **object-class** argument element. The administrator shall specify one **object-identification** value associated with the **object-class**.714 For each supported **object-class**, the server shall start the paused object specified by the **object-identification** identified by the **ObjectIdentification** element.716 A print server shall either accept or reject a request to resume an **object-identification**. The print server shall return any attribute warnings or abstract-errors to the print client.718 Each **object-identification** shall take one of the following forms:

object-class Specification	ObjectIdentification element	object-identification Values
id-oc-printer	simple-name	Printer name representing a physical printer. When resumed, a physical printer shall resume printing its currently assigned print job, if any, at the same unspecified pausable point where it was stopped. Use of the Pause and Resume operations for a logical printer is not supported.
id-oc-server	simple-name	Server name. when resumed, the print server shall begin distributing print jobs to printers.

719 **message**

720 See 8.1.2.

721 **common-arguments**722 See clause 8.1.2 in ISO/IEC 10175-1 for a description of the **CommonArguments** type.723 **8.3.9.2 Resume-result**

724 The result of this abstract-operation is formally defined as follows:

```

725     ResumeResult ::= SEQUENCE {
726         object-status          [0] SET OF Attribute OPTIONAL }

```

727 The server may return object-status attributes of the resumed object.

728 **8.3.9.3 Resume Abstract-errors**

729 If the request fails, the server shall return one of the listed abstract-errors. The circumstances under which the server
730 will return a particular abstract-error are defined in clause 8.4 of ISO/IEC 10175-1.

731 **8.3.10 Set**

732 This abstract-operation allows an administrator to set attribute values of a specified printing object.

733 Some restrictions on modifications to attributes of object classes apply and are described below.

734 The server shall be able to modify the following Job Object attributes:

- all Job Information attributes except for id-att-job-identifier, id-att-job-originator, id-att-job-owner, and id-att-initial-value-job
- all Job Results Handling attributes
- all Job Event Handling attributes
- all Job Scheduling Instruction attributes
- all Printer Selection attributes except for id-att-printer-name-requested

735 The server shall not modify the following Job Object attributes: Access and Accounting attributes, Job Security
736 attributes, Job Status attributes, and Job Size attributes.

- The server shall be able to modify the following Document Object attributes:
- all Document Information attributes
- all Document Production Instructions attributes except for id-att-initial-value-document
- all Document Description attributes except for id-att-document-content and id-att-transfer-method
- all Document Characteristic attributes

737 The server shall not modify the following Document Object attributes: Document Status attributes.

738 The list of attributes in each of the above categories shall contain at least the list of attributes defined in the ISO
739 10175 {1} standard definition of these categories. The addition of attributes to these general categories beyond those
740 defined in the ISO 10175 {1} standard is implementation defined.

741 Restrictions on modifications to other attributes of other object classes are implementation-defined.

742 There are four "modification" operations: **replace**, **add-values**, **remove-values**, **set-to-default**.

743 NOTE 1 - The client may change whether a document attribute or a job attribute is compulsory or non-compulsory. If
744 an attribute is to be specified as non-compulsory, then the non-compulsory-attributes attribute (for a document
745 attribute) or the job-non-compulsory-attributes attribute (for a job attribute) shall contain the attribute type
746 **ObjectIdentifier** of the attribute that the server is to consider as non-compulsory. If an attribute is to be specified as
747 compulsory, then the non-compulsory-attributes attribute or the job-non-compulsory-attributes attribute shall *not*
748 contain the attribute type **ObjectIdentifier** of the attributes that the server is to consider as compulsory.

749 The server shall perform the requested modifications on the specified print object. Changes made by the server shall
750 be persistent, that is, objects shall retain their modified values across system restarts.

751 The behavior of a server when using the **Set** abstract-operation to modify job attributes or document attributes shall
752 be the same as the behavior when using the **ModifyJob** abstract-operation. See clause 8.2.2 in ISO/IEC 10175-1 for
753 a description of the **ModifyJob** abstract-operation.

754 However, for printer and server object classes, the ability of a server to successfully set a printer attribute or a server
755 attribute, and the resulting effect, depends upon the attribute involved and upon the presence of the attribute-type
756 object identifier in the **printer-non-compulsory-attributes** attribute or the **server-non-compulsory-attributes**
757 attribute. If the server cannot perform the specified modification for any compulsory attribute (e.g., due to

758 conflicting requirements, unavailability of a feature, or current status of the object), the server shall reject the **Set**
759 abstract-operation.

760 In general, the server shall ignore or reject modifications to particular printer or server attributes in a **Set** abstract-
761 operation in a manner consistent with the treatment they would have received had they been submitted in the **Create**
762 abstract-operation arguments. However, if it is necessary to reject a specified modification to any attribute (e.g., a
763 compulsory attribute with an unsupported value is specified), then the server shall reject the entire **Set** abstract-
764 operation and the printer or server attributes will remain unchanged.

765 In particular, if an attempt is made to remove an attribute from the value of the **printer-non-compulsory-attributes**
766 or **server-non-compulsory-attributes**, the server shall reject the **Set** abstract-operation if such a value would have
767 caused the original **Create** abstract-operation to be rejected. In this case, the server shall report an **invalid-non-**
768 **compulsory-attribute-modification AttributeError**.

769 The server shall reject any **Set** abstract-operation that attempts to modify (1) the attributes that this International
770 Standard specifies as non-modifiable or (2) the attributes for which the server does not support modification, and
771 shall return an **illegal-modification AttributeError** to the print client. If the server rejects a modification because it
772 does not support modification of an attribute or attributes, the server shall identify all such attributes in the
773 **AttributeError** returned.

774 This abstract-operation is formally defined as follows:

```
775     Set ::= ABSTRACT-OPERATION
776         ARGUMENT           SetArgument
777         RESULT             SetResult
778         ERRORS             { AccessError,
779                             SecurityError,
780                             ServiceError }
```

781 NOTE 2 - Normally only an appropriately authorized administrator set object attributes. However, this is a site and/or
782 enterprise-specific policy decision, not mandated by this International Standard.

783 8.3.10.1 Set-argument

784 The argument of this abstract-operation is formally defined as follows:

```
785     SetArgument ::= SEQUENCE {
786         object-class           [0] OBJECT IDENTIFIER, -- id-oc-xxx
787         object-identification [1] ObjectIdentification,
788         message                 [2] Message OPTIONAL,
789         attr-modification       [3] SEQUENCE OF AttrModification OPTIONAL,
790         common-arguments       [4] CommonArguments OPTIONAL }
791
792     AttrModification ::= SEQUENCE {
793         attribute-id           [0] AttributeId,
794         attribute-values [1] SET OF ANY -- DEFINED BY attribute-id -- OPTIONAL,
795         modify-operator [2] ModifyOperator DEFAULT replace }
```

795

796 The following argument elements shall be supported by the server:

797 **object-class**

798 This argument element shall specify the object class of the **object-identification** to modify. The **object-class**
799 argument shall be one of the following values: **id-oc-auxiliary-sheet**, **id-oc-auxiliary-sheet-package**, **id-oc-**
800 **delivery-method**, **id-oc-document**, **id-oc-finishing**, **id-oc-font**, **id-oc-initial-value-document**, **id-oc-initial-value-**
801 **job**, **id-oc-imposition**, **id-oc-job**, **id-oc-medium**, **id-oc-output**, **id-oc-printer**, **id-oc-resource**, **id-oc-resource-**
802 **context**, **id-oc-scheduler**, **id-oc-server**, or **id-oc-transfer-method**.

803 **object-identification**

804 This argument element shall specify the **object-identification** based on the value of the **object-class** argument
 805 element. The administrator shall specify one **object-identification** value associated with the **object-class**.

806 For each supported **object-class**, the server shall set the attributes for the object specified by the **object-**
 807 **identification** identified by the **ObjectIdentification** element.

808 A print server shall either accept or reject a request to set attributes for an **object-identification**. The print server
 809 shall return any attribute warnings or abstract-errors to the print client.

810 Each **object-identification** shall take one of the following forms:

object-class Specification	ObjectIdentification element	object-identification Values
id-oc-job	job-identifier	Global job identifier. The server shall modify or set job and document attributes of previously submitted print jobs which have not yet begun printing on the physical printer. If the job has already begun printing, the results are unspecified. The effect of modifying job and/or document attributes on a print job is the same as if that job or document had been submitted originally with the modified attribute values. Scheduling of the job may be impacted, depending on the print server implementation and the attribute modifications made.
id-oc-document	document-identifier	Document identifier. Documents are numbered starting with 1. The ability to modify a currently printing document is implementation-defined. The effect of modifying document attributes on a document is the same as if that document had been submitted originally with the modified attribute values. Scheduling of the print job may be impacted, depending on the print server implementation and the attribute modifications made.
id-oc-printer	simple-name	Printer name representing a logical or physical printer.
id-oc-server	simple-name	Server name.
id-oc-initial-value-document	name-or-oid	Initial-value-document name. Contains the attributes of the document class that the server may default when constructing a document object.
id-oc-initial-value-job	name-or-oid	Initial-value-job name. Contains the attributes of the job class that the server may default when constructing a job object.
id-oc-auxiliary-sheet	name-or-oid	Start sheet, end sheet, separator sheet name.
id-oc-auxiliary-sheet-package	name-or-oid	Predefined package of start sheets, end sheets, and separator sheets referenced by a single name.
id-oc-delivery-method	object-identifier	Delivery method identifier; such as for print job output.
id-oc-finishing	name-or-oid	Finishing method name; such as stapling, folding, or binding.
id-oc-font	font-reference	Font name.

id-oc-imposition	name-or-oid	Imposition method name; such as 2-up or 4-up.
id-oc-medium	name-or-oid	Media name; such as iso-a4-white or north-american-letter.
id-oc-output	object-identifier	Output method identifier; such as sorting or collating.
id-oc-resource	name-or-oid	Resource identifier; such as overlay or logo.
id-oc-resource-context	name-or-oid	Resource context name; encapsulate details about the server's environment that, when used with a resource name, uniquely identifies a resource in the environment of that server.
id-oc-scheduler	object-identifier	Scheduler name; determines the order in which jobs are sent to physical printer.
id-oc-transfer-method	object-identifier	Transfer method identifier; such as ftam , with-request , or push-by-client .

811 **message**

812 See 8.1.2.

813 **attr-modification**

814 This argument element shall specify the modification to be performed on the **object-identification**, and contains the
815 following necessary information:

- 816 a) **attribute-id**: identification of attribute to be modified
- 817 b) **attribute-values**: value(s) to be assigned to the attribute (if appropriate)
- 818 c) **modify-operator**: type of modification to be performed. Possible modification types are described in
819 the following table:

modify-operator Value	Description
replace	Replaces the entire value of of the attribute identified by attribute-id with the value(s) specified in attribute-values , or adds the attribute to the print object, if the attribute was not present.
add-values	Adds the values specified in attribute-values to the attribute identified by attribute-id
remove-values	Removes the value(s) specified in attribute-values from the attribute identified by attribute-id to the server-default.
set-to-default	Sets the value of the attribute identified by attribute-id to the server-default.

820 **common-arguments**

821 See clause 8.1.2 in ISO/IEC 10175-1 for a description of the **CommonArguments** type.

822 **8.3.10.2 Set-result**

823 The result of this abstract-operation is formally defined as follows:

```
824 SetResult ::= SEQUENCE {
825     object-status [0] SET OF Attribute OPTIONAL }
```

826 The server shall return the supported subset of the **object-status** attributes of the object whose attributes were set.

827 The following table contains a list of attributes for each **object-class**.

Object	object-class Specification	Attributes
--------	-----------------------------------	------------

Job	id-oc-job	id-att-job-identifier id-att-job-name id-att-current-job-state id-att-job-state-reasons id-att-intervening-jobs id-att-printer-name-requested id-att-printers-assigned id-att-total-job-octets id-att-job-owner
Document	id-oc-document	id-att-document-sequence-number id-att-document-format id-att-document-state id-att-octet-count id-att-copy-count id-att-sides id-att-document-type
Printer	id-oc-printer	id-att-printer-name id-att-printer-realization id-att-printer-state id-att-availability id-att-associated-server id-att-printer-locations id-att-printer-associated-printers id-att-scheduler-ready
Server	id-oc-server	id-att-server-name id-att-server-state id-att-availability id-att-logical-printers-supported id-att-physical-printers-supported
Medium	id-oc-medium	id-att-medium-identifier id-att-associated-server id-att-medium-realization id-att-medium-type id-att-medium-associated-media id-att-medium-size id-att-medium-dimensions id-att-medium-sides id-att-medium-color
Imposition	id-oc-imposition	id-att-imposition-identifier id-att-associated-server id-att-imposition-specification id-att-number-up
Initial-value-job	id-oc-initial-value-job	id-att-initial-value-job-identifier id-att-associated-server id-att-logical-printers-ready id-att-physical-printers-ready id-att-printer-locations-requested id-att-printer-models-requested id-att-job-retention-period
Initial-value-document	id-oc-initial-value-document	id-att-initial-value-document-identifier id-att-associated-server id-att-logical-printers-ready

		id-att-physical-printers-ready id-att-copy-count id-att-sides id-att-document-format
Font	id-oc-font	id-att-font-identifier id-att-associated-server id-att-file-reference
Auxiliary-sheet	id-oc-auxiliary-sheet	id-att-auxiliary-sheet-identifier id-att-auxiliary-sheet-medium id-att-associated-server
Auxiliary-sheet-package	id-oc-auxiliary-sheet-package	id-att-auxiliary-sheet-package-identifier id-att-associated-server
Transfer-method	id-oc-transfer-method	id-att-transfer-method-identifier id-att-transfer-method-type id-att-document-reference-type id-att-associated-server
Resource	id-oc-resource	id-att-resource-name id-att-resource-type id-att-associated-server id-att-file-reference
Resource-context	id-oc-resource-context	id-att-resource-context-identifier id-att-context-address id-att-associated-server
Delivery-method	id-oc-delivery-method	id-att-delivery-method-identifier id-att-associated-server
Finishing	id-oc-finishing	id-att-finishing-identification id-att-finishing-realization id-att-associated-server id-att-finishing-specification id-att-finishing-associated-finishings
Output	id-oc-output	id-att-output-identifier id-att-associated-server
Scheduler	id-oc-scheduler	id-att-scheduler-identifier id-att-associated-server

828 **8.3.10.3 Set Abstract-errors**

829 If the request fails, the server shall return one of the listed abstract-errors. The circumstances under which the server
830 will return a particular abstract-error are defined in clause 8.4 of ISO/IEC 10175-1.

831 **8.3.11 Shutdown**

832 This abstract-operation allows an administrator to shutdown a specified print server or physical printer.

833 The means for restarting a printer or server which has been shutdown with this operation is provided by the **Control**
834 operation with the **reset** attribute set to **reset-power-cycle**.

835 The **when** argument element shall specify how much processing must occur before the shutdown can take place. The
836 server shall stop printing currently printing jobs either immediately (as soon as the printer technology allows), or as
837 indicated by the **when** argument element.

838 The server shall keep any jobs that had been submitted to the printer or server and continue processing them when
839 the printer or server is restarted. The server may also submit the jobs to an alternate physical printer, if one is
840 available.

841 When a print server is shutdown, it is first disabled. This shall prevent new print jobs from being accepted.
 842 Currently scheduled print jobs on a print server being shutdown shall be saved; the print jobs shall be re-scheduled
 843 when the print server is restarted.

844 The order in which jobs will be printed shall not be changed by the invocation of the **Shutdown** operation.

845 The ability to shutdown physical printers is an implementation option.

846 This abstract-operation is formally defined as follows:

```

847     Shutdown ::= ABSTRACT-OPERATION
848         ARGUMENT      ShutdownArgument
849         RESULT        ShutdownResult
850         ERRORS        { AccessError,
851                       SecurityError,
852                       ServiceError }
    
```

853 NOTE - Normally only an appropriately authorized administrator may shutdown an object. However, this is a site
 854 and/or enterprise-specific policy decision, not mandated by this International Standard.

855 **8.3.11.1 Shutdown-argument**

856 The argument of this abstract-operation is formally defined as follows:

```

857     ShutdownArgument ::= SEQUENCE {
858         object-class      [0] OBJECT IDENTIFIER,
859                             -- id-oc-server, -id-oc-printer
860         object-instance  [1] ObjectIdentification,
861                             -- choice depends on class
862         message          [2] Message OPTIONAL,
863         when              [3] OBJECT IDENTIFIER,
864                             -- now, after-current, after-all
865         common-arguments [4] CommonArguments OPTIONAL }
    
```

866 The following argument elements shall be supported by the server:

867 **object-class**

868 This argument element shall specify the object class of the **object-instance**. The **object-class** argument shall be one
 869 of the following values: **id-oc-printer** or **id-oc-server**.

870 **object-instance**

871 This argument element shall specify the **object-instance** based on the value of the **object-class** argument element.
 872 The administrator shall specify one **object-instance** value associated with the **object-class**.

873 For each supported **object-class**, the server shall shutdown the object specified by the **object-instance** identified by
 874 the **ObjectIdentification** element.

875 A print server shall either accept or reject a request to shut down an **object-instance**. The print server shall return
 876 any attribute warnings or abstract-errors to the print client.

877 Each **object-instance** shall take one of the following forms:

object-class Specification	ObjectIdentification element	object-instance Values
id-oc-printer	simple-name	Printer name representing a physical printer. The server shall: a) Disable the physical printer. This prevents the physical printer from accepting new print

		<p>requests.</p> <p>b) Based on the value of the when argument element, stop printing as soon as possible (now), allow the physical printer to complete its current print job (after-current), or allow the physical printer to complete all jobs currently submitted to it (after-all).</p> <p>c) Place the physical printer in the shutdown state. Restart is accomplished by the Control operation with the reset attribute set to id-val-reset -power-cycle. Use of the Shutdown operation for a logical printer is not supported.</p>
id-oc-server	simple-name	<p>Server name.</p> <p>To shut down a server, the print server shall:</p> <p>a) Disable the server. This prevents the print server from accepting new print jobs.</p> <p>b) If the value of the when argument element is not after-all, place the print server in the on-request state. This prevents print jobs from being assigned to physical printers.</p> <p>c) Based on the value of the when argument element, for each physical printer stop printing as soon as possible (now), allow physical printers to complete their current print jobs (after-current), or allow the physical printers to complete all jobs currently submitted to them (after-all).</p> <p>d) Place each physical printer in the paused state.</p> <p>e) Remove entries in the name service for all objects supported by this print server, if such entries exist and are required by the server implementation.</p> <p>f) Place the print server in the terminating state.</p> <p>g) Retain (save) any jobs not yet printed to be re-scheduled on server start-up.</p>

878 **message**

879 See 8.1.2.

880 **when**

881 This argument element shall specify how much processing must occur before the shutdown can take place. The
882 when argument shall be one of the following values:

Descriptive Name:	Object Identifier	action taken:
now	id-val-generic-now	Aborts current jobs as soon as possible
after-current	id-val-generic-after-current	Currently printing jobs finish printing
after-all	id-val-generic-after-all	All submitted print jobs finish printing

883 *Temporary note - these object identifier values are to be defined in Annex A of ISO/IEC 10175-1.*

884 **common-arguments**

885 See clause 8.1.2 in ISO/IEC 10175-1 for a description of the **CommonArguments** type.

886 **8.3.11.2 Shutdown-result**

887 The result of this abstract-operation is formally defined as follows:

```
888     ShutdownResult ::= SEQUENCE {
889         object-status    [0] SET OF Attribute OPTIONAL }
```

890 The server shall return specified printer-status attributes of the shutdown object.

891 **8.3.11.3 Shutdown Abstract-errors**

892 If the request fails, the server shall return one of the listed abstract-errors. The circumstances under which the server
893 will return a particular abstract-error are defined in clause 8.4 of ISO/IEC 10175-1.

894 **8.4 Abstract-Errors**

895 See clause 8.4 of ISO/IEC 10175-1.

896 Many reasons for failure of an operation are generally not specified by the operation descriptions. Operations may
897 terminate prematurely and return an abstract-error to the print client if they encounter invalid usage of argument
898 elements (see clause 8.4.2 of ISO/IEC 10175-1, **Attribute-error**); difficulties accessing objects (see clause 8.4.1 of
899 ISO/IEC 10175-1, **Access-error**, clause 8.4.6 of ISO/IEC 10175-1, **Selection-error**, or clause 8.4.8 of ISO/IEC
900 10175-1, **Update-error**); or difficulties associated with the privileges of the process (see clause 8.4.5 of ISO/IEC
901 10175-1, **Security-error**). When an unrecoverable error condition is encountered, the operation shall return an
902 abstract-error to the print client (see clause 8.4.4 of ISO/IEC 10175-1, **Printer-error** or clause 8.4.7 of ISO/IEC
903 10175-1, **Service-error**).

904 *Temporary Note - The following subclauses provide descriptions of the abstract-errors ServiceError and*
905 *UpdateError, with two additional problem values required for this part of ISO/IEC 10175. An Addendum is to be*
906 *proposed to revise these abstract-error definitions in ISO/IEC 10175-1, as indicated in the following subclauses. The*
907 *clause numbers shown are those of ISO/IEC 10175-1.*

908 **8.4.7 Service-error**

909 A **ServiceError** reports a problem related to the provision of the service, which is not due to an incorrect abstract-
910 operation request or the requester's access rights.

```
911     ServiceError ::= ABSTRACT-ERROR
912         PARAMETER ServiceErrorSequence

913     ServiceErrorSequence ::= SEQUENCE OF
914         SEQUENCE {
915             problem          [0] ServiceProblem,
916             attribute        [1] Attribute OPTIONAL,
917             object-identification [2] ObjectIdentification, -- see 8.2.4.1
918             error-message    [3] ErrorMessage }
```

```

919 ServiceProblem ::= CHOICE {
920     standard-problem      ENUMERATED {
921         server-busy                (1),
922         server-unavailable          (2),
923         operation-too-complex      (3),
924         resource-limit-exceeded    (4),
925         unclassified-server-error   (5),
926         too-many-items-in-list     (6),
927         compulsory-resource-not-available (7),
928         cancel-document-unsupported (8),
929         modify-document-unsupported (9),
930         print-multiple-documents-unsupported (10),
931         unsupported-parameter-value (11),
932         invalid-checkpoint         (12),
933         invalid-continuation-context (13),
934         pause-limit-exceeded       (14),
935         unsupported-operation       (15),
936         clean-logical-printer-unsupported (16) }, -- new problem
937     extended-problem      OBJECT IDENTIFIER }

```

938 A **ServiceProblem** reported may be one of the following:

939 a) through o) See ISO/IEC 10175-1.

940 *Temporary note - New service-problem for DPA-3:*

941 p) **clean-logical-printer-unsupported**: A client attempted to clean a logical printer that is considered by the
942 server to be a gateway, as opposed to a container.

943 8.4.8 Update-error

944 An **UpdateError** reports a problem encountered when a client attempts to modify (update), explicitly, an existing
945 DPA-Object. Cancellation of a print-job and resubmission of a print job are also considered here as modifications.

```

946 UpdateError ::= ABSTRACT-ERROR
947     PARAMETER UpdateErrorSequence
948 UpdateErrorSequence ::= SEQUENCE {
949     problem                [0] UpdateProblem,
950     object-identification [1] ObjectIdentification, -- see ISO/IEC 10175-1,
951                                     -- clause 8.2.4.1
952     error-message          [2] ErrorMessage }
953 UpdateProblem ::= CHOICE {
954     standard-problem      ENUMERATED {
955         no-modifications-allowed    (1),
956         insufficient-update-rights   (2),
957         previous-operation-incomplete (4),
958         cancellation-not-possible    (5),
959         resubmit-job-not-possible    (6), -- new problem
960         deletion-not-possible        (7)}, -- new problem
961     extended-problem      OBJECT IDENTIFIER }

```

962 An **UpdateProblem** may be one of the following:

963 a) through d): See ISO/IEC 10175..

964 *Temporary note - New update-problems for DPA-3:*

- 965 e) **resubmit-job-not-possible:** A client made an attempt to resubmit a print-job that was in a state for which
966 the server implementation does not support resubmission, such as while the job is printing (most server
967 implementations should permit cancellation while printing) or was already complete.
- 968 f) **deletion-not-possible:** A client attempted to delete a server or physical printer object that currently
969 contained jobs.

970 **8.5 Abstract-Events**

971 See clause 8.5 of ISO/IEC 10175-1.

972 *Temporary Note - The following **event-report** types are required for this part of ISO/IEC 10175. An Addendum is to*
973 *be proposed to add these **event-report** definitions in ISO/IEC 10175-1. The clause number shown is for that*
974 *subclause of ISO/IEC 10175-1 to which the new event-report types are to be added.*

975 **8.5.4 Event-report class**

976 A report event occurs whenever a significant point in the processing of the job occurs. The following report event
977 types are defined:

- 978 a) through I) - *See ISO/IEC 10175-1.*

979 *Temporary note - New event-report types for DPA-3:*

- 980 j) **id-val-event-report-job-cancelled:** The server has completed cancelling the print-job.
- 981 k) **id-val-event-report-printer-cleaned:** The clean operation has been completed on the printer.
- 982 l) **id-val-event-report-server-cleaned:** The clean operation has been completed on the server.

983 **Annex A**

984 (normative)

985 **Formal definition of the DPA management abstract service**

986

987 This Annex is a supplement to section two, formally defining the Document Printing management abstract service. It
988 employs ASN.1 and the ABSTRACT-OPERATION and ABSTRACT-ERROR macros of ISO/IEC 10021-3.

989 The order of the ASN.1 productions in this Annex follows the order of the operation definitions in clause 8. In case
990 of discrepancies between this Annex and clause 8, this Annex shall take precedence.

991

992 -- File: DPA_3B.ASN, Version 0.1, 20-October-1996

993 -- Version 0.1, 20-October-1996

994

995

996 -- ANNEX B

997

1000 -- FORMAL DEFINITION OF THE DPA MANAGEMENT ABSTRACT SERVICE

1001

1002 -- This normative annex is an integral part of this part of ISO/IEC

1003 -- 10175.

1004

1005 -- This Annex is a supplement to section two and formally defines the

1006 -- Document Printing management abstract service. It employs ASN.1 and the

1007 -- ABSTRACT-OPERATION and ABSTRACT-ERROR macros of ISO/IEC 10021-3.

1008

1009

1010 DPAManagementAbstractService {iso standard dpa(10175) part-3(3) modules(0)

1011 abstract-service(1) }

1012 DEFINITIONS IMPLICIT TAGS ::=

1013 BEGIN

1014 -- PROLOGUE --

1015 -- EXPORTS everything --

1016

1017 IMPORTS

1018

1019 -- Abstract service macros --

1020 ABSTRACT-ERROR, ABSTRACT-OPERATION

1021 FROM AbstractServiceNotation

1022 { joint-iso-ccitt mhs-motis(6) asdc(2) modules(0) notation(1) }

1023

1024

1025 -- Data types from DPA abstract service (see ISO/IEC 10175-1 ANNEX B) --

1026 Attribute, AttributeId, CommonArguments, ModifyOperator, ObjectIdentification

1027 AccessError, AttributeError, PrinterError, SecurityError, SelectionError,

1028 ServiceError, UpdateError

1029 FROM DPAAbstractService

1030 { iso standard dpa(10175) part-1(1) modules(0) abstract-service(1) }

ISO/IEC DIS 10175-3(E)

```

1031
1032 -- Data types from DPA attributes (see ISO/IEC 10175-1 ANNEX C) --
1033 Message, JobIdentifier, DistinguishedNameString
1034 FROM DPASstandardAttributes
1035     {iso standard dpa(10175) part-1(1) modules(0) attributes(2) }
1036
1037
1038 -- end of IMPORTS
1039
1040
1041 -----
1042
1043 --          DPA ABSTRACT OBJECTS --
1044
1045     Temporary Note - The the dp-administration-port is currently defined in ISO/IEC 10175-1, but does not include the
1046 additional abstract-operations defined in this part of ISO/IEC 10175. An Addendum will be proposed to revise the dp-
1047 administration-port definition in ISO/IEC 10175-1 to conform to the following definition; when the addendum is
1048 approved, this syntax definition will be removed from this part of ISO/IEC 10175.
1049
1050 dp-administration-port    PORT
1051     CONSUMER INVOKES {
1052         promote-job,           -- PromoteJob
1053         interrupt-job,        -- InterruptJob
1054         pause-job,            -- PauseJob
1055         resume-job }          -- ResumeJob
1056     ::= id-pt-dp-administration
1057
1058 -----
1059
1060 -- ABSTRACT OPERATIONS --
1061
1062 -- Clean --
1063
1064 Clean ::= ABSTRACT-OPERATION
1065     ARGUMENT      CleanArgument
1066     RESULT        CleanResult
1067     ERRORS        { AccessError,
1068                     SecurityError,
1069                     ServiceError }
1070
1071 CleanArgument ::= SEQUENCE {
1072     object-class    [0] OBJECT IDENTIFIER,
1073                     -- id-oc-server, id-oc-printer
1074     object-instance [1] ObjectIdentification,
1075                     -- choice depends on object class
1076     message         [2] Message OPTIONAL,
1077     common-arguments [3] CommonArguments OPTIONAL }
1078
1079

```

```

1080 CleanResult ::= SEQUENCE {
1081     object-status [0] SET OF Attribute OPTIONAL }
1082
1083 -----
1084
1085 -- Control --
1086
1087 Control ::= ABSTRACT-OPERATION
1088     ARGUMENT      ControlArgument
1089     RESULT        ControlResult
1090     ERRORS        { AccessError,
1091                   SecurityError,
1092                   ServiceError }
1093
1094 ControlArgument ::= SEQUENCE {
1095     object-class [0] OBJECT IDENTIFIER,
1096                 -- id-oc-server, id-oc-printer
1097     object-instance [1] ObjectIdentification,
1098                 -- choice depends on object class
1099     message [2] Message OPTIONAL,
1100     operations [3] SEQUENCE OF Attribute,
1101                 -- operands and parameters
1102                 -- Current operations: reset and trace
1103     common-arguments [4] CommonArguments OPTIONAL }
1104
1105 ControlResult ::= SEQUENCE {
1106     object-status [0] SET OF Attribute OPTIONAL }
1107
1108 -----
1109
1110 -- Create --
1111
1112 Create ::= ABSTRACT-OPERATION
1113     ARGUMENT      CreateArgument
1114     RESULT        CreateResult
1115     ERRORS        { AccessError,
1116                   SecurityError,
1117                   SelectionError,
1118                   ServiceError }
1119
1120 CreateArgument ::= SEQUENCE {
1121     object-class [0] OBJECT IDENTIFIER, -- id-oc-xxx
1122                 -- any id-oc-xxx, excluding job and document
1123     object-instance [1] ObjectIdentification,
1124                 -- instance identifier depends on class
1125     message [2] Message OPTIONAL,
1126     copy-from [3] ObjectIdentification OPTIONAL,
1127                 -- initial value object (IVO)
1128     force-creation [4] BOOLEAN DEFAULT FALSE,
1129                 -- recreate if necessary
1130     object-attributes [5] SET OF Attribute OPTIONAL,
1131                 -- attributes of new object instance
1132     common-arguments [6] CommonArguments OPTIONAL }

```

```

1133 CreateResult ::= SEQUENCE {
1134     object-status [0] SET OF Attribute }
1135
1136 -----
1137
1138 -- Delete --
1139
1140 Delete ::= ABSTRACT-OPERATION
1141     ARGUMENT      DeleteArgument
1142     RESULT        DeleteResult
1143     ERRORS        { AccessError,
1144                     SecurityError,
1145                     ServiceError,
1146                     UpdateError }
1147
1148 DeleteArgument ::= SEQUENCE {
1149     object-class [0] OBJECT IDENTIFIER,
1150                 -- any id-oc, including job and server
1151     object-instance [1] ObjectIdentification,
1152                 -- choice depends on class
1153     message [2] Message OPTIONAL,
1154     common-arguments [3] CommonArguments OPTIONAL }
1155
1156 DeleteResult ::= SEQUENCE {
1157     object-status [0] SET OF Attribute OPTIONAL }
1158
1159 -- Disable --
1160
1161
1162 Disable ::= ABSTRACT-OPERATION
1163     ARGUMENT      DisableArgument
1164     RESULT        DisableResult
1165     ERRORS        { AccessError,
1166                     SecurityError,
1167                     ServiceError }
1168
1169 DisableArgument ::= SEQUENCE {
1170     object-class [0] OBJECT IDENTIFIER,
1171                 -- id-oc-server, -id-oc-printer
1172     object-instance [1] ObjectIdentification,
1173                 -- choice depends on class
1174     message [2] Message OPTIONAL,
1175                 -- value of id-att-server-message,
1176                 -- id-att-printer-message
1177     common-arguments [3] CommonArguments OPTIONAL }
1178
1179 DisableResult ::= SEQUENCE {
1180     object-status [0] SET OF Attribute OPTIONAL }
1181
1182 -- Enable --
1183
1184 Enable ::= ABSTRACT-OPERATION
1185     ARGUMENT      EnableArgument

```

```

1186         RESULT          EnableResult
1187         ERRORS          { AccessError,
1188                          SecurityError,
1189                          ServiceError }
1190 EnableArgument ::= SEQUENCE {
1191     object-class      [0] OBJECT IDENTIFIER,
1192                      -- id-oc-server, -id-oc-printer
1193     object-instance  [1] ObjectIdentification,
1194                      -- choice depends on class
1195     message          [2] Message OPTIONAL,
1196                      -- value of id-att-server-message,
1197                      -- id-att-printer-message
1198     common-arguments [3] CommonArguments OPTIONAL }
1199
1200 EnableResult ::= SEQUENCE {
1201     object-status    [0] SET OF Attribute OPTIONAL }
1202
1203 -----
1204
1205 -- Pause --
1206
1207 Pause ::= ABSTRACT-OPERATION
1208     ARGUMENT          PauseArgument
1209     RESULT            PauseResult
1210     ERRORS            { AccessError,
1211                       AttributeError,
1212                       SecurityError,
1213                       SelectionError,
1214                       ServiceError }
1215
1216 PauseArgument ::= SEQUENCE {
1217     object-class      [0] OBJECT IDENTIFIER,
1218                      -- id-oc-printer, id-oc-server
1219     object-identification [1] ObjectIdentification,
1220     message          [2] Message OPTIONAL,
1221                      -- value of id-att-printer-message,
1222                      -- id-att-server-message, id-att-message
1223     common-arguments  [3] CommonArguments OPTIONAL }
1224
1225 PauseResult ::= SEQUENCE {
1226     affected-job-identifier [0] JobIdentifier OPTIONAL,
1227                      --returned if a job was printing on the
1228                      --printer being paused
1229     paused-object-status  [1] SET OF Attribute OPTIONAL }
1230
1231 -----
1232
1233 -- ResubmitJob --
1234
1235 ResubmitJob ::= ABSTRACT-OPERATION
1236     ARGUMENT          ResubmitJobArgument
1237     RESULT            ResubmitJobResult
1238     ERRORS            { AccessError,

```

```

1239             AttributeError,
1240             PrinterError,
1241             SecurityError,
1242             SelectionError,
1243             ServiceError,
1244             UpdateError }
1245
1246 ResubmitJobArgument ::= SEQUENCE {
1247     object-class          [0] OBJECT IDENTIFIER,
1248                         -- id-oc-job, id-oc-printer,
1249                         -- id-oc-server
1250     object-identification [1] ObjectIdentification,
1251     printer               [2] DistinguishedNameString,
1252     message               [3] Message OPTIONAL,
1253     common-arguments     [4] CommonArguments OPTIONAL }
1254
1255 ResubmitJobResult ::= SEQUENCE {
1256     result-set    [0] SEQUENCE OF ObjectStatus }
1257                 -- one result-set for each job resubmitted
1258                 -- (or for each job attempted to be resubmitted)
1259
1260 ObjectStatus ::= SEQUENCE {
1261     object-status [0] SET OF Attribute OPTIONAL }
1262                 -- job-identifier and new-job-identifier shall be
1263                 -- returned at least. For any jobs that could not
1264                 -- be resubmitted, the new-job-identifier attribute
1265                 -- shall be omitted as the only error indication.
1266
1267
1268 -----
1269
1270 -- Resume --
1271 Resume ::= ABSTRACT-OPERATION
1272     ARGUMENT      ResumeArgument
1273     RESULT        ResumeResult
1274     ERRORS        { AccessError,
1275                   AttributeError,
1276                   SecurityError,
1277                   SelectionError,
1278                   ServiceError }
1279
1280 ResumeArgument ::= SEQUENCE {
1281     object-class          [0] OBJECT IDENTIFIER,
1282                         -- id-oc-printer, id-oc-server
1283     object-identification [1] ObjectIdentification,
1284     message               [2] Message OPTIONAL,
1285                         -- value of id-att-printer-message,
1286                         -- id-att-server-message, id-att-message
1287     common-arguments     [3] CommonArguments OPTIONAL }
1288
1289 ResumeResult ::= SEQUENCE {
1290     object-status    [0] SET OF Attribute OPTIONAL }
1291

```

```

1292 -----
1293
1294 -- Set --
1295
1296 Set ::= ABSTRACT-OPERATION
1297     ARGUMENT      SetArgument
1298     RESULT        SetResult
1299     ERRORS        { AccessError,
1300                   SecurityError,
1301                   ServiceError }
1302
1303 SetArgument ::= SEQUENCE {
1304     object-class      [0] OBJECT IDENTIFIER, -- id-oc-xxx
1305     object-identification [1] ObjectIdentification,
1306     message           [2] Message OPTIONAL,
1307     attr-modification [3] SEQUENCE OF AttrModification OPTIONAL,
1308     common-arguments  [4] CommonArguments OPTIONAL }
1309
1310 AttrModification ::= SEQUENCE {
1311     attribute-id      [0] AttributeId,
1312     attribute-values [1] SET OF ANY -- DEFINED BY attribute-id -- OPTIONAL,
1313     modify-operator  [2] ModifyOperator DEFAULT replace }
1314
1315 SetResult ::= SEQUENCE {
1316     object-status    [0] SET OF Attribute OPTIONAL }
1317
1318 -----
1319
1320 -- Shutdown --
1321 Shutdown ::= ABSTRACT-OPERATION
1322     ARGUMENT      ShutdownArgument
1323     RESULT        ShutdownResult
1324     ERRORS        { AccessError,
1325                   SecurityError,
1326                   ServiceError }
1327
1328 ShutdownArgument ::= SEQUENCE {
1329     object-class      [0] OBJECT IDENTIFIER,
1330                       -- id-oc-server, -id-oc-printer
1331     object-instance  [1] ObjectIdentification,
1332                       -- choice depends on class
1333     message          [2] Message OPTIONAL,
1334     when             [3] OBJECT IDENTIFIER,
1335                       -- now, after-current, after-all
1336     common-arguments [4] CommonArguments OPTIONAL }
1337
1338 ShutdownResult ::= SEQUENCE {
1339     object-status    [0] SET OF Attribute OPTIONAL }
1340
1341 -----
1342

```

```

1343 -- ABSTRACT ERRORS --
1344
1345 Temporary Note - The abstract-errors ServiceError and UpdateError are currently defined in ISO/IEC 10175, but
1346 they are repeated here to show the inclusion one new ServiceProblem and two new UpdateProblems that are required
1347 for this part of ISO/IEC 10175. An Addendum will be proposed to revise the ServiceError and UpdateError
1348 definitions in ISO/IEC 10175-1; when the addendum is approved, this syntax definition will be removed from this part
1349 of ISO/IEC 10175.
1350
1351 -- Service-Error --
1352
1353 ServiceError ::= ABSTRACT-ERROR
1354     PARAMETER ServiceErrorSequence
1355 ServiceErrorSequence ::= SEQUENCE OF
1356     SEQUENCE {
1357         problem                [0] ServiceProblem,
1358         attribute              [1] Attribute OPTIONAL,
1359         object-identification [2] ObjectIdentification, -- see 8.2.4.1
1360         error-message          [3] ErrorMessage }
1361 ServiceProblem ::= CHOICE {
1362     standard-problem ENUMERATED {
1363         server-busy                (1),
1364         server-unavailable         (2),
1365         operation-too-complex      (3),
1366         resource-limit-exceeded   (4),
1367         unclassified-server-error  (5),
1368         too-many-items-in-list    (6),
1369         compulsory-resource-not-available (7),
1370         cancel-document-unsupported (8),
1371         modify-document-unsupported (9),
1372         print-multiple-documents-unsupported (10),
1373         unsupported-parameter-value (11),
1374         invalid-checkpoint        (12),
1375         invalid-continuation-context (13),
1376         pause-limit-exceeded      (14),
1377         unsupported-operation      (15),
1378         clean-logical-printer-unsupported (16) }, -- new problem
1379     extended-problem             OBJECT IDENTIFIER }
1380
1381 -- Update-error --
1382
1383 UpdateError ::= ABSTRACT-ERROR
1384     PARAMETER UpdateErrorSequence
1385
1386 UpdateErrorSequence ::= SEQUENCE {
1387     problem                [0] UpdateProblem,
1388     object-identification [1] ObjectIdentification, -- see ISO/IEC 10175-1
1389                                     -- clause 8.2.4.1
1390     error-message          [2] ErrorMessage }
1391
1392 UpdateProblem ::= CHOICE {
1393     standard-problem             ENUMERATED {
1394         no-modifications-allowed (1),

```

```
1395         insufficient-update-rights      (2),
1396         previous-operation-incomplete    (4),
1397         cancellation-not-possible        (5) ,
1398         resubmit-job-not-possible        (6) , -- new problem
1399         deletion-not-possible            (7)}, -- new problem
1400     extended-problem                      OBJECT IDENTIFIER  }
1401
1402
1403
1404     END -- of DPAManagementAbstractService --
1405
```

1406 **Annex B**

1407
1408 (normative)

1409
1410 **Conformance requirements**

1411

1412 This Annex is a supplement to section two. Its purpose is to define different levels of DP-Server functionality in
1413 terms of the level of support provided for the abstract operations and attributes defined in this International Standard.
1414 These levels are to be used in specifying the conformance levels which particular DP-Servers purport to implement,
1415 and thus, which features and facilities clients of those DP-Servers may expect to access.

1416 Two levels of functionality are defined in ISO/IEC 10175-1, levels 1 and 2; for each level, an additional set of
1417 attributes is specified for multiple-document job support, indicated by the letter M. Thus, level 1M indicates the
1418 server supports the basic set of operations and attributes, and can support multiple-document jobs. See ISO/IEC
1419 10175-1, Annex E, for specifications of these conformance requirements.

1420 This part of ISO/IEC 10175 defines one additional level of conformance, level 3; additional conformance
1421 requirements are also specified for level 3 systems providing multiple-document support, designated level 3M.

1422 The Conformance level operation and attribute sets are defined in the following sub-clauses:

1423 **B.1 Conformance level 3**

1424 A server conforming to level 3 shall support the operations, objects, and attributes specified for level 2 conformance,
1425 and in addition shall support the following operations, objects, and attributes, as a minimum:

a) Abstract operations supported:

Clean
Control
Create
Delete
Disable
Enable
Pause
Resume
Set
Shutdown

b) Objects supported:

TBD

c) Attributes supported:

TBD

1426 **B.2 Conformance level 3M**

1427 This classification is applicable to level 3 servers that support multiple-document jobs.

1428 A server conforming to level 3M shall support the operations, objects, and attributes specified for level 3
1429 conformance, and shall in addition adhere to the conformance requirements specified for level 2M.

1430

1431 **Annex C**

1432 (informative)

1433 **Issues to Resolve in Conjunction with DPA Part 1**

1434

1435 The issues below relate to all parts of DPA as a whole. These issues have surfaced as a result of the creation of the
1436 DPA Part 3 document.

1437 To all reviewers: Please provide feedback on the following issues. A few potential solutions are provided, but there
1438 may be more.

1439 a) Do we need Access Control Lists for controlling access to objects?

1440 b) Attributes Requested by the client

1441 The Set and Create operations in POSIX allows the client to specify attributes for which the server will
1442 return the value. Below are potential resolutions to this issue.

1443 1) Require the server to return with the result all attribute values listed in POSIX as "requested-attributes"
1444 for the Set operation and for the Create operation.

1445 2) Don't return any attribute values, and thus require the client to call ListObjectAttributes to obtain all of
1446 the desired attribute values.

1447 3) Other?

1448 c) Set operation errors, for values that the server cannot support

1449 The Set operation allows the client to specify one or more attributes to be set. If Set is able to set some of
1450 the attributes, but is unable to set others, how should the result be returned to the client? Note that the
1451 server may have already acted on some settings before it reached the first attribute that it could not set.
1452 Currently, DPA Part 1 doesn't accommodate a multi-valued result. Below are potential resolutions to this
1453 issue.

1454 1) Perform the Set operation, and return a list of the attributes that the server could not set, but do not
1455 return an error. This involves adding a multi-valued Set-result component that contains all attributes
1456 that failed.

1457 2) Require the server to pre-scan all attributes to determine if there are any that it knows it cannot set. If
1458 there are any that the server cannot set, reject the Set operation with an error.

1459 3) Perform the Set operation, and when the server reaches the first attribute that it determines that it
1460 cannot set, return an error to the client, and return the first attribute that failed in the Set-result.

1461 4) Other?

1462 d) Should new attributes, errors and events that are required by this part of ISO/IEC 10175 be defined in this
1463 part, or should they be defined in an addendum or corrigendum to part 1 of ISO/IEC 10175?

1464

Annex D

(informative)

Proposed Additions to DPA Part 1

1467
1468
1469
1470
1471
1472

1473 D.1 Additional items

1474 The items below are proposed additions to DPA Part 1; alternatively, some or all of these additions may be included
1475 in this part of ISO/IEC 10175. These additions have surfaced as a result of the creation of the DPA Part 3 document.

1476 D.1.1 New **UpdateError** type needed: **resubmit-job-not-possible**

1477 This new **UpdateError** is needed for the **Resubmit-job** operation. If the job to be resubmitted is currently
1478 printing, the request shall be rejected and the print server shall return the **resubmit-job-not-possible**
1479 **UpdateError** to the print client.

1480 D.1.2 Two new attributes for **id-oc-printer** and **id-oc-server** needed: **object-non-compulsory-attributes** and 1481 **object-ignored-attributes**

1482 These new attributes are needed for the **Create** operation. The **non-compulsory-attributes** attribute will
1483 provide a means for the print client to specify which object attributes the server may ignore when they
1484 cannot be satisfied during the Create operation. If a non-compulsory attribute cannot be satisfied, the server
1485 shall create the object and shall add the attribute oid of the problem attribute to the **ignored-attributes**
1486 attribute. However, if the problem attribute is not specified in the **non-compulsory-attributes** attribute, the
1487 server shall reject the request, and shall return the appropriate **AttributeError** to the print client.

1488 D.1.3 New **Event-report** type needed: **id-val-event-report-job-cancelled**

1489 This new **Event-report** type is needed for the **CancelJob** operation. Since the **CancelJob** operation is
1490 asynchronous, the print client does not know when this operation has been completed. Upon completion of
1491 the **CancelJob** operation, the server shall notify the print client with the **id-val-event-report-job-cancelled**
1492 event.

1493 D.1.4 New **Event-report** types needed: **id-val-event-report-printer-cleaned**, and 1494 **id-val-event-report-server-cleaned**

1495 These new **Event-report** types are needed for the **Clean** operation. Since the **Clean** operation relies on the
1496 asynchronous **CancelJob** operation, the **Clean** operation is also asynchronous. Thus, the print client does
1497 not know when the **Clean** operation has been completed on a printer or on a server. Upon completion of the
1498 cleaning of a printer, the server shall notify the print client with the **id-val-event-report-printer-cleaned**
1499 event; upon completion of the cleaning of a server, the server shall notify the print client with the **id-val-**
1500 **event-report-server-cleaned** event.

1501 D.1.5 New **UpdateError** type needed: **deletion-not-possible**

1502 This new **UpdateError** is needed for the **Delete** operation. If the server or physical printer to be deleted
1503 currently contains jobs, the request shall be rejected and the print server shall return the **deletion-not-**
1504 **possible UpdateError** to the print client.

1505 D.1.6 New **ServiceError** type needed: **clean-logical-printer-unsupported**

1506 This new **ServiceError** is needed for the **Clean** operation. If the printer to be cleaned is a logical printer
1507 which is considered by the server implementation to be a gateway, as opposed to a container, the request

1508 shall be rejected and the print server shall return the **clean-logical-printer-unsupported ServiceError** to
 1509 the print client.

1510 D.1.7 New attributes needed: **reset** and **trace-enable**

1511 These new attributes are needed for the **operations** argument element of the **Control** operation.

1512 D.1.8 New attribute values needed: **id-val-power-cycle-reset**, **id-val-reset-to-nvram** and
 1513 **id-val-reset-to-factory-defaults**

1514 These new attribute values are needed for the **reset** attribute, which is an argument element of the **Control**
 1515 operation.

1516 D.1.9 New **Event-report** type needed: **id-val-event-report-job-resubmitted**

1517 This new **Event-report** type is needed for the **ResubmitJob** operation. Since the **ResubmitJob** operation is
 1518 asynchronous, the print client does not know when this operation has been completed, or when individual
 1519 resubmitted jobs have been accepted by a print server. Upon acceptance of each job included in a
 1520 resubmission request, the server shall notify the print client with the **id-val-event-report-job-resubmitted**
 1521 event.

1522 D.2 State Transition Tables

1523 State Transition Tables should be added to ISO/IEC 10175-1 for the following objects:

- 1524 • Physical printer object -- see D.2.1
- 1525 • Logical printer object -- see D.2.2
- 1526 • Server object -- see D.2.3

1527

1 **D.2.1 Physical Printer State Transitions**

2 The following is the State Transition Table for the Physical Printer object.

DPA Printer States													
printer object does not exist	unknown	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	timed-out	shutdown	
DPA operations													
CancelJob (see Note 12)	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	idle or connecting-to-printer (see Note 4)	idle or printing (see Note 4)	paused	idle or job-start-wait (see Note 4)	idle or job-end-wait (see Note 4)	idle or job-password-wait (see Note 4)	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Clean (see Note 12)	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	idle	idle	paused	idle	idle	idle	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Control (power-cycle-reset)	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	idle	idle	idle	idle	idle	idle	idle (see Note 3)	idle (see Note 3)	idle	idle
Control (reset-to-nvram)	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	idle	idle	idle	idle	idle	idle	idle (see Note 3)	idle (see Note 3)	idle	inappropriate-object-state Access-error
Control (reset-to-factory-defaults)	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	idle	idle	idle	idle	idle	idle	idle (see Note 3)	idle (see Note 3)	idle	inappropriate-object-state Access-error

DPA Printer States														
	printer object does not exist	unknown	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	timed-out	shutdow n	
Create	idle	printer object does not exist or object-already-exists Selection-error (see Note 6)	printer object does not exist or object-already-exists Selection-error (see Note 6)	printer object does not exist or object-already-exists Selection-error (see Note 6)	printer object does not exist or object-already-exists Selection-error (see Note 6)	printer object does not exist or object-already-exists Selection-error (see Note 6)	printer object does not exist or object-already-exists Selection-error (see Note 6)	printer object does not exist or object-already-exists Selection-error (see Note 6)	printer object does not exist or object-already-exists Selection-error (see Note 6)	printer object does not exist or object-already-exists Selection-error (see Note 6)	printer object does not exist or object-already-exists Selection-error (see Note 6)	printer object does not exist or object-already-exists Selection-error (see Note 6)	inappropriate-object-state Access-error	printer object does not exist or object-already-exists Selection-error (see Note 6)
Delete	unknown-identification Selection-error	printer object does not exist	inappropriate-object-state Access-error	printer object does not exist										
Disable (see Note 1)	unknown-identification Selection-error	inappropriate-object-state Access-error	idle (disabled)	connecting-to-printer (disabled)	printing (disabled)	paused (disabled)	job-start-wait (disabled)	job-end-wait (disabled)	job-password-wait (disabled)	needs-attention (disabled)	needs-key-operator (disabled)	inappropriate-object-state Access-error	inappropriate-object-state Access-error	
Enable (see Note 1)	unknown-identification Selection-error	inappropriate-object-state Access-error	idle (enabled)	connecting-to-printer (enabled)	printing (enabled)	paused (enabled)	job-start-wait (enabled)	job-end-wait (enabled)	job-password-wait (enabled)	needs-attention (enabled)	needs-key-operator (enabled)	inappropriate-object-state Access-error	inappropriate-object-state Access-error	
Interrupt Job	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	idle	idle	inappropriate-object-state Access-error	idle	idle	idle	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error	
ListObject Attributes	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error	

DPA Printer States													
	printer object does not exist	unknown	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	timed-out	shutdown
ModifyJob	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	connecting-to-printer or idle (see Note 9)	printing or idle (see Note 9) or needs-attention or needs-key-operator (see Note 10)	paused	job-start-wait or idle (see Note 9)	job-end-wait or idle (see Note 9)	job-password-wait or idle (see Note 9)	needs-attention or needs-key-operator or printing (see Note 11)	needs-key-operator or needs-attention or printing (see Note 11)	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Pause	unknown-identification Selection-error	inappropriate-object-state Access-error	paused	paused	paused	inappropriate-object-state Access-error	paused	paused	paused	paused	paused	inappropriate-object-state Access-error	inappropriate-object-state Access-error
PauseJob	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Print	unknown-identification Selection-error	inappropriate-object-state Access-error	idle (see Note 7)	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Promote Job	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Resubmit Job	unknown-identification Selection-error	inappropriate-object-state Access-error	idle (see Note 7)	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error

DPA Printer States													
	printer object does not exist	unknown	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	timed-out	shutdown
Resume	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	state from which printer entered paused state (see Note 2)	printing	idle	printing	inappropriate-object-state Access-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Resume Job	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Set	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	connecting-to-printer or idle (see Note 9)	printing or idle (see Note 9) or needs-attention or needs-key-operator (see Note 10)	paused	job-start-wait or idle (see Note 9)	job-end-wait or idle (see Note 9)	job-password-wait or idle (see Note 9)	needs-attention or needs-key-operator or printing (see Note 11)	needs-key-operator or needs-attention or printing (see Note 11)	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Shutdown	unknown-identification Selection-error	inappropriate-object-state Access-error	shutdown	shutdown	shutdown	shutdown	shutdown	shutdown	shutdown	shutdown	shutdown	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Conditions and events													
job becomes available	n/a	n/a	connecting-to-printer or printing (see Note 8);	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	n/a	n/a
connection to printer completes	n/a	n/a	n/a	printing	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

DPA Printer States													
	printer object does not exist	unknown	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	timed-out	shutdow n
current job completes	n/a	n/a	n/a	n/a	idle	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
server aborts job	n/a	n/a	idle	idle	idle	paused	idle	idle	idle	needs-attention	needs-key-operator	n/a	n/a
output device senses that it needs human attention (no special skills required) (see Note 5)	n/a	n/a	needs-attention	needs-attention	needs-attention	needs-attention	needs-attention	needs-attention	needs-attention	needs-attention	needs-key-operator	n/a	n/a
output device senses that it needs the attention of a key operator (see Note 5)	n/a	n/a	needs-key-operator	needs-key-operator	needs-key-operator	needs-key-operator	needs-key-operator	needs-key-operator	needs-key-operator	needs-key-operator	needs-key-operator	n/a	n/a
output device senses reason for needing attention has been satisfied	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	state from which printer entered needs-attention state	state from which printer entered needs-key-operator state	n/a	n/a
job-start-wait job attribute set on current job being processed	n/a	n/a	n/a	connecting-to-printer	job-start-wait	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	n/a	n/a

DPA Printer States													
printer object does not exist	unknown	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	timed-out	shutdow n	
job-end-wait job attribute set on current job being processed	n/a	n/a	n/a	connecting-to-printer	job-end-wait	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	n/a	n/a
job-password-wait job attribute set on current job being processed	n/a	n/a	n/a	connecting-to-printer	job-password-wait	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	n/a	n/a
operator performs output device implementation-specific action to resume printer	n/a	n/a	n/a	n/a	n/a	state from which printer entered paused state (see Note 2)	printing	idle	printing	n/a	n/a	n/a	n/a
server was unable to get a response from the printer in the time specified by the printers printer-timeout-period attribute	n/a	n/a	timed-out	timed-out	timed-out	timed-out	timed-out	timed-out	timed-out	timed-out	timed-out	timed-out	timed-out

8

DPA Printer States													
printer object does not exist	unknown	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	timed-out	shutdown	
printer becomes available without operator-intervention after having timed out	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	idle	n/a

9

NOTES

- 10 1 The **Disable** and **Enable** operations control the ability of the printer to accept new jobs, and does not change the printer state. The printer proceeds from state to state in a disabled mode just as it does in an enabled mode. When the enabled mode is set, the printer accepts new print jobs; when disabled mode is set, the printer does not accept new print jobs.
- 11
- 12
- 13 2 For **Resume** operation in **paused** state:
- 14 • If printer entered **paused** state from **idle**, **connecting-to-printer**, **printing**, **needs-attention** or **needs-key-operator** state, it shall return to that state.
 - 15 • If printer entered **paused** state from **job-start-wait** or **job-password-wait** states, it shall return to the **printing** state.
 - 16 • If printer entered **paused** state from **job-end-wait** states, it shall return to the **idle** state.
- 17 3 After the **Control** operation is invoked for a **power-cycle-reset**, **reset-to-nvram** or **reset-to-factory-defaults**, if the previous condition that caused the printer to be in the **needs-attention** or **needs-key-operator** states still exists, the hardware shall again sense its existence and shall return the printer to the appropriate state.
- 18
- 19 4 If the **CancelJob** operation is acting on the current job being processed, the printer transitions to the **idle** state; otherwise, the printer remains in the original state.
- 20 5 When the output device senses the need for operator attention, the required operator skills depend on the nature of the task to be performed. Example tasks for which no special skills are required are as follows: adding paper, clearing a jam, changing the medium, etc. Example printer-specific tasks of a key operator are as follows: adding toner or developer, attending to a hardware fault, etc.
- 21
- 22
- 23 6 For the **Create** operation, if the argument element **force-creation** = **TRUE**, and a printer object already exists, the server deletes the existing object and creates a new one. If **force-creation** = **FALSE**, the server returns the **object-already-exists Selection-error**.
- 24
- 25 7 For the **Print** and **ResubmitJob** operations, this standard assumes that some finite amount of time is required to completely receive the job.
- 26 8 When a job becomes available and the printer is in the **idle** state, the printer transitions to the **connecting-to-printer** state if a connection to the printer is necessary, and to the **printing** state if a connection to the printer is NOT necessary.
- 27
- 28 9 For the **ModifyJob** and **Set** operations, if the user modifies the **job-abort-criteria** or **document-abort-criteria** attributes when the printer is processing the job (i.e. **connecting-to-printer**, **printing**, **job-start-wait**, **job-end-wait**, **job-password-wait** printer states) such that the **criterion-threshold** for the **error-count**, **warning-count**, or
- 29

30 **processing-time** becomes less than that which has already accumulated for the current job, the printer shall abort the job and shall transition to the **idle** state. Otherwise, the
31 printer shall remain in the original state.

32 10 For the **ModifyJob** and **Set** operations, if the user modifies the **job-results-handling** or **printer-selection** job attributes, or the **document-production-instructions** or
33 **document-characteristics** document attributes, when the printer is in the **printing** state, and the printer cannot support the new settings, the printer shall transition to either
34 the **needs-attention** state or the **needs-key-operator** state, depending on the required level of human intervention. Otherwise, the printer shall remain in the **printing** state.

35 11 For the **ModifyJob** and **Set** operations, if the user modifies the **job-results-handling** or **printer-selection** job attributes, or the **document-production-instructions** or
36 **document-characteristics** document attributes, when the printer is in the **needs-attention** state or the **needs-key-operator** state, and this modification resolves the reason that
37 the printer was in the original state, the printer shall transition to the **printing** state. Otherwise, the printer shall remain in the original state.

38 12 There may be some delay in the completion of the **Clean** operation when invoked since its semantics are like those of the **CancelJob** operation, and the **CancelJob** operation is
39 an asynchronous operation.

10 **D.2.2 Logical Printer State Transitions**

11 The following is the State Transition Table for the Logical Printer object. This table assumes that the logical printer states are derived solely from the physical printer states.
12 There are three configurations to consider:

- 13 a) The “one-to-one” case of one logical printer associated with one physical printer:
- 14 b) The “fan-in” case of multiple logical printers associated with one physical printer:
- 15 c) The “fan-out” case of one logical printer associated with multiple physical printers:

16 For both the “one-to-one” case and the “fan-in” case above, the state of the logical printer directly reflects the state of the physical printer.

17 However, for the “fan-out” case, determining the state of the logical printer is more complicated, and thus, shall be derived from the algorithm below.

18 The algorithm to determine the state of a logical printer is as follows:

19 The state of a logical printer, LP, that is associated with n-physical printers, PP1, PP2, ..., PPn, is the first state in the following sequential list that matches the state
20 of any one of the n associated physical printers:

- 21 a) **idle**
- 22 b) **printing**
- 23 c) **connecting-to-printer**
- 24 d) **needs-attention**
- 25 e) **needs-key-operator**
- 26 f) **job-end-wait**
- 27 g) **job-start-wait**
- 28 h) **job-password-wait**
- 29 i) **paused**
- 30 j) **shutdown**
- 31 k) **timed-out**
- 32 l) **unknown**

33 The sequence of states in the above algorithm for determining the logical printer state from the physical printer state is based on the following prioritizing criteria:

- 34 a) Priority is given to the printer state which is least affected by the client or user interactions: For example, without any user-involvement, the printer could find
35 itself in the **idle**, **printing**, **connecting-to-printer**, **needs-attention** and **needs-key-operator** states, whereas the following states arise from specific attributes
36 set by the client or from explicit client or user operations such as **Pause** or **Shutdown**: **job-end-wait**, **job-start-wait**, **job-password-wait**, **paused** and
37 **shutdown** states.

- 58 b) Priority is given to the printer state which allows a client's job to get printed the soonest. For example, a client's job should get printed the soonest if the printer
 59 is in the **idle** state, next soonest if in the **printing** state since the **connecting-to-printer** could take some time, next soonest in the **connecting-to-printer** state,
 70 followed by **needs-attention** and **needs-key-operator** states. The same criteria was applied to the second five states in the list.
- 71 c) Priority is given to the printer state which is likely to be the easiest transition to the **printing** state. For example, a client's job is likely to get printed sooner if
 72 the printer is in the **job-start-wait** state versus the **job-password-wait**, since the former may require any operator to change the paper in tray 1 and the latter
 73 may require a specific operator to enter a private password. The same criteria was applied to the **shutdown**, **timed-out** and **unknown** states.

74 Below are a few examples of the derivation of the logical printer state for the case of three physical printers (PP1, PP2, PP3) associated with a single logical printer (LP):

- 75 • If PP1, PP2 and PP3 are all in the **printing** state, then LP is in the **printing** state.
- 76 • If PP1 is in the **idle** state, PP2 is in the **printing** state and PP3 is in the **needs-attention** state, then LP is in the **idle** state.
- 77 • If PP1 and PP2 are in the **printing** state and PP3 is in the **needs-attention** state, then LP is in the **printing** state.
- 78 • If PP1 is in the **job-start-wait** state, PP2 is in the **paused** state, and PP3 is in the **needs-attention** state, then LP is in the **job-start-wait** state.
- 79 • If PP1 is in the **needs-key-operator** state, PP2 is in the **paused** state, and PP3 is in the **shutdown** state, then LP is in the **needs-key-operator** state.

30 The following is the State Transition Table for the Logical Printer object.

DPA Printer States													
printer object does not exist	unknown	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	timed-out	shutdown	
DPA operations													
CancelJob (see Note 9)	inappropriate-object-state Access-error	idle	idle or connecting-to-printer (see Note 3)	unknown-identification Selection-error	paused	idle or job-start-wait (see Note 3)	idle or job-end-wait (see Note 3)	idle or job-password-wait (see Note 3)	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error	
Clean (see Note 9)	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	idle	idle	paused	idle	idle	idle	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error

DPA Printer States													
	printer object does not exist	unknown	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	timed-out	shutdown
Control (power-cycle-reset) (see Note 2)	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError
Control (reset-to-nvram) (see Note 2)	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError
Control (reset-to-factory-defaults) (see Note 2)	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError
Create	idle or unknown (see Note 10)	printer object does not exist or object-already-exists Selection-error (see Note 4)	printer object does not exist or object-already-exists Selection-error (see Note 4)	printer object does not exist or object-already-exists Selection-error (see Note 4)	printer object does not exist or object-already-exists Selection-error (see Note 4)	printer object does not exist or object-already-exists Selection-error (see Note 4)	printer object does not exist or object-already-exists Selection-error (see Note 4)	printer object does not exist or object-already-exists Selection-error (see Note 4)	printer object does not exist or object-already-exists Selection-error (see Note 4)	printer object does not exist or object-already-exists Selection-error (see Note 4)	printer object does not exist or object-already-exists Selection-error (see Note 4)	inappropriate-object-state Access-error	printer object does not exist or object-already-exists Selection-error (see Note 4)
Delete	unknown-identification Selection-error	printer object does not exist	inappropriate-object-state Access-error	printer object does not exist									
Disable (see Note 1)	unknown-identification Selection-error	inappropriate-object-state Access-error	idle (disabled)	connecting-to-printer (disabled)	printing (disabled)	paused (disabled)	job-start-wait (disabled)	job-end-wait (disabled)	job-password-wait (disabled)	needs-attention (disabled)	needs-key-operator (disabled)	inappropriate-object-state Access-error	inappropriate-object-state Access-error

DPA Printer States													
	printer object does not exist	unknown	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	timed-out	shutdown
Enable (see Note 1)	unknown-identification Selection-error	inappropriate-object-state Access-error	idle (enabled)	connecting-to-printer (enabled)	printing (enabled)	paused (enabled)	job-start-wait (enabled)	job-end-wait (enabled)	job-password-wait (enabled)	needs-attention (enabled)	needs-key-operator (enabled)	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Interrupt Job	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	idle	idle	inappropriate-object-state Access-error	idle	idle	idle	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error
ListObject Attributes	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error
ModifyJob	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	connecting-to-printer or idle (see Note 6)	printing or idle (see Note 6) or needs-attention or needs-key-operator (see Note 7)	paused	job-start-wait or idle (see Note 6)	job-end-wait or idle (see Note 6)	job-password-wait or idle (see Note 6)	needs-attention or needs-key-operator or printing (see Note 8)	needs-key-operator or needs-attention or printing (see Note 8)	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Pause (see Note 2)	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError
PauseJob	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error

DPA Printer States													
	printer object does not exist	unknown	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	timed-out	shutdown
Print	unknown-identification Selection-error	inappropriate-object-state Access-error	idle (see Note 5)	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Promote Job	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Resubmit Job	unknown-identification Selection-error	inappropriate-object-state Access-error	idle (see Note 5)	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Resume (see Note 2)	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError	unsupported-operation ServiceError
Resume Job	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	inappropriate-object-state Access-error	inappropriate-object-state Access-error
Set	unknown-identification Selection-error	inappropriate-object-state Access-error	idle	connecting-to-printer-to-printer or idle (see Note 6)	printing or idle (see Note 6) or needs-attention or needs-key-operator (see Note 7)	paused	job-start-wait or idle (see Note 6)	job-end-wait or idle (see Note 6)	job-password-wait or idle (see Note 6)	needs-attention or needs-key-operator or printing (see Note 8)	needs-key-operator or needs-attention or printing (see Note 8)	inappropriate-object-state Access-error	inappropriate-object-state Access-error

DPA Printer States													
printer object does not exist	unknown	idle	connecting-to-printer	printing	paused	job-start-wait	job-end-wait	job-password-wait	needs-attention	needs-key-operator	timed-out	shutdown	
Shutdown (see Note 2)	unsupported-operation ServiceError												
Conditions and events													
current job completes	n/a	n/a	n/a	n/a	idle	n/a							
server aborts job	n/a	n/a	idle	idle	idle	paused	idle	idle	idle	needs-attention	needs-key-operator	n/a	n/a
server was unable to get a response from the printer in the time specified by the printers printer-timeout-period attribute	n/a	n/a	timed-out										
printer becomes available without operator-intervention after having timed out	n/a	idle	n/a										

NOTES

- 35
- 36 1 The **Disable** and **Enable** operations control the ability of the logical printer to accept new jobs, and does not change the printer state. The logical printer proceeds from state to
37 state in a disabled mode just as it does in an enabled mode. When the enabled mode is set, the logical printer accepts new print jobs; when disabled mode is set, the logical
38 printer does not accept new print jobs.
- 39 2 The following operations are not supported for a logical printer object: **Control** (**power-cycle-reset**, **reset-to-nvram** and **reset-to-factory-defaults**), **Pause**, **Resume** and
40 **Shutdown**.
- 41 3 If the **CancelJob** operation is acting on the current job being processed, the logical printer transitions to the **idle** state (if not already in **idle**) since the physical printer that is
42 actually printing the job transitions to the **idle** state. Otherwise, the logical printer remains in the original state.
- 43 4 For the **Create** operation, if the argument element **force-creation** = **TRUE**, and a logical printer object already exists, the server deletes the existing object and creates a
44 new one. If **force-creation** = **FALSE**, the server returns the **object-already-exists Selection-error**.
- 45 5 For the **Print** and **ResubmitJob** operations, this standard assumes that some finite amount of time is required for the logical printer to completely receive the job.
- 46 6 For the **ModifyJob** and **Set** operations, if the user modifies the **job-abort-criteria** or **document-abort-criteria** attributes when the physical printer is processing the job (i.e.
47 **connecting-to-printer**, **printing**, **job-start-wait**, **job-end-wait**, **job-password-wait** printer states) such that the **criterion-threshold** for the **error-count**, **warning-count**, or
48 **processing-time** becomes less than that which has already accumulated for the current job, the physical printer shall abort the job and shall transition to the **idle** state. If the
49 logical printer is not already in the **idle** state, it shall also transition to the **idle** state. Otherwise, the printer shall remain in the original state.
- 50 7 For the **ModifyJob** and **Set** operations, if the user modifies the **job-results-handling** or **printer-selection** job attributes, or the **document-production-instructions** or
51 **document-characteristics** document attributes, when the physical printer is in the **printing** state, but it cannot support the new settings, the physical printer shall transition to
52 either the **needs-attention** state or the **needs-key-operator** state, depending on the required level of human intervention. The logical printer may or may not transition to a new
53 state as a result of the algorithm described above for determining the state of the logical printer. Otherwise, the printer shall remain in the **printing** state.
- 54 8 For the **ModifyJob** and **Set** operations, if the user modifies the **job-results-handling** or **printer-selection** job attributes, or the **document-production-instructions** or
55 **document-characteristics** document attributes, when the physical printer is in the **needs-attention** state or the **needs-key-operator** state, and this modification resolves the
56 reason that it was in the original state, the physical printer shall transition to the **printing** state. The logical printer may or may not transition to a new state as a result of the
57 algorithm described above for determining the state of the logical printer. Otherwise, the printer shall remain in the original state.
- 58 9 There may be some delay in the completion of the **Clean** operation when invoked since its semantics are like those of the **CancelJob** operation, and the **CancelJob** operation is
59 an asynchronous operation.
- 60 10 For the **Create** operation, if the logical printer is created without a **printer-associated-printers** attribute, the state of the new logical printer is **unknown**.
- 61

2 **D.2.3 Server State Transitions**

3 The following is the State Transition Table for the Server object.

DPA Server (Generic) States								
server object does not exist	unknown	initializing	ready	busy	on-request	unavailable	terminating	
DPA operations								
CancelJob (see Note 8)	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	ready	ready or busy (see Note 3)	on-request	service-unavailable Service-error	inappropriate-object-state Access-error
Clean (see Note 8)	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	ready	ready	on-request	service-unavailable Service-error	inappropriate-object-state Access-error
Control (power-cycle-reset)	unknown-identification Selection-error	inappropriate-object-state Access-error	initializing	initializing	initializing	initializing	initializing	initializing
Control (reset-to-nvram)	unknown-identification Selection-error	inappropriate-object-state Access-error	initializing	initializing	initializing	initializing	initializing	initializing
Control (reset-to-factory-defaults)	unknown-identification Selection-error	inappropriate-object-state Access-error	initializing	initializing	initializing	initializing	initializing	initializing
Create	initializing	server object does not exist or object-already-exists Selection-error (see Note 4)	service-unavailable Service-error	server object does not exist or object-already-exists Selection-error (see Note 4)				
Delete	unknown-identification Selection-error	server object does not exist	service-unavailable Service-error	server object does not exist				
Disable (see Note 1)	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	ready (disabled)	busy (disabled)	on-request (disabled)	service-unavailable Service-error	inappropriate-object-state Access-error
Enable (see Note 1)	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	ready (enabled)	busy (enabled)	on-request (enabled)	service-unavailable Service-error	inappropriate-object-state Access-error
DPA Server (Generic) States								

	server object does not exist	unknown	initializing	ready	busy	on-request	unavailable	terminating
InterruptJob	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	ready	on-request	service-unavailable Service-error	inappropriate-object-state Access-error
ListObjectAttributes	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	ready	busy	on-request	service-unavailable Service-error	terminating
ModifyJob	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	ready	busy or ready (see Note 5) or on-request (see Note 6)	on-request or busy (see Note 7)	service-unavailable Service-error	inappropriate-object-state Access-error
Pause	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	on-request	on-request	inappropriate-object-state Access-error	service-unavailable Service-error	inappropriate-object-state Access-error
PauseJob	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	busy	on-request	service-unavailable Service-error	inappropriate-object-state Access-error
Print	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	busy	busy	on-request	service-unavailable Service-error	inappropriate-object-state Access-error
PromoteJob	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	ready	busy	on-request	service-unavailable Service-error	inappropriate-object-state Access-error
ResubmitJob	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	busy	busy	on-request	service-unavailable Service-error	inappropriate-object-state Access-error
Resume	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	state from which server entered on-request state (see Note 2)	service-unavailable Service-error	inappropriate-object-state Access-error
ResumeJob	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	busy	on-request	service-unavailable Service-error	inappropriate-object-state Access-error
Set	unknown-identification Selection-error	inappropriate-object-state Access-error	inappropriate-object-state Access-error	ready	busy or ready (see Note 5) or on-request (see Note 6)	on-request or busy (see Note 7)	service-unavailable Service-error	inappropriate-object-state Access-error
DPA Server (Generic) States								

	server object does not exist	unknown	initializing	ready	busy	on-request	unavailable	terminating
Shutdown	unknown-identification Selection-error	inappropriate-object-state Access-error	terminating	terminating	terminating	terminating	service-unavailable Service-error	inappropriate-object-state Access-error
Conditions and events								
initialization completes	n/a	n/a	ready	n/a	n/a	n/a	n/a	n/a
job becomes available	n/a	n/a	n/a	busy	busy	on-request	n/a	n/a
job completes	n/a	n/a	n/a	n/a	ready or busy (see Note 3)	n/a	n/a	n/a
server aborts job	n/a	n/a	n/a	n/a	ready or busy (see Note 3)	n/a	n/a	n/a
server senses that it needs human attention	n/a	n/a	on-request	on-request	on-request	on-request	n/a	n/a
server becomes available after impl.-specific human-intervention at the server	n/a	n/a	n/a	n/a	n/a	state from which server entered on-request state for the following states only: initializing, ready, or busy	n/a	n/a
server becomes available without human-intervention	n/a	n/a	n/a	n/a	n/a	n/a	ready	n/a

NOTES

- 1 The **Disable** and **Enable** operations control the ability of the server to accept new jobs, and does not change the server state. The server proceeds from state to state in a disabled mode just as it does in an enabled mode. When the enabled mode is set, the server accepts new print jobs; when disabled mode is set, the server does not accept new print jobs.
- 2 For **Resume** operation in **on-request** state, if the server entered **on-request** state from the **initializing**, **ready**, or **busy** state, it shall return to that state
- 3 When the client invokes the **CancelJob** operation, when the server aborts a job, or when a job completes, and the server is in the **busy** state, the server transitions to the **ready** state if the current job being processed is the only job on the server, and the server remains in the **busy** state if the current job being processed is NOT the only job on the server.
- 4 For the **Create** operation, if the argument element **force-creation** = **TRUE**, and a server object already exists, the server deletes the existing object and creates a new one. If **force-creation** = **FALSE**, the server returns the **object-already-exists Selection-error**.
- 5 For the **ModifyJob** and **Set** operations, if the user modifies the **job-abort-criteria** or **document-abort-criteria** attributes when the server is in the **busy** state such that the **criterion-threshold** for the **error-count**, **warning-count**, or **processing-time** becomes less than that which has already accumulated for the current job, and if the current job being processed is the only job on the server, the printer shall abort the job, and the server shall transition to the **ready** state. Otherwise, the server shall remain in the **busy** state.
- 6 For the **ModifyJob** and **Set** operations, if the user modifies the **job-results-handling** or **printer-selection** job attributes, or the **document-production-instructions** or **document-characteristics** document attributes, when the server is in the **busy** state, and the server cannot support the new settings, the server shall transition to the **on-request** state. Otherwise, the server shall remain in the **busy** state.
- 7 For the **ModifyJob** and **Set** operations, if the user modifies the **job-results-handling** or **printer-selection** job attributes, or the **document-production-instructions** or **document-characteristics** document attributes, when the server is in the **on-request** state, and this modification resolves the reason that the server was in the **on-request** state, the server shall transition to the **busy** state. Otherwise, the server shall remain in the **on-request** state.
- 8 There may be some delay in the completion of the **Clean** operation when invoked since its semantics are like those of the **CancelJob** operation, and the **CancelJob** operation is an asynchronous operation.

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