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2 Web Services Resource Properties 1.2 3 (WS-ResourceProperties)

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13 **Abstract:**

14 The relationship between Web services and stateful resources is defined in [WS-
15 Resource]. This relationship is described as the WS-Resource Access Pattern [WS-
16 Resource]. In the WS-Resource Access Pattern, messages to a Web service may include
17 a component that identifies a stateful resource to be used in the execution of the
18 message. We refer to the composition of a stateful resource and a Web service as a WS-
19 Resource [WS-Resource].

20 This document standardizes the means by which the definition of the properties of a WS-
21 Resource may be declared as part of a Web service interface. The declaration of the WS-
22 Resource's properties represents a projection of or a view on the WS-Resource's state.
23 This projection is defined in terms of a resource properties document. This resource
24 properties document serves to define a basis for access to the resource properties
25 through Web service interfaces.

26 This specification also defines a standard set of message exchanges that allow a
27 requestor to query or update the property values of the WS-Resource. The set of
28 properties defined in the resource properties document associated with the service
29 interface defines the constraints on the valid contents of these message exchanges.

30 **Status:**

31 implementations. Committee members should send comments on this specification to the
32 wsrf@lists.oasis-open.org list. Others should subscribe to and send comments to the
33 wsrf-comment@lists.oasis-open.org list. To subscribe, send an email message to wsrf-

34 comment-subscribe@lists.oasis-open.org with the word "subscribe" as the body of the
35 message.

36 For information on whether any patents have been disclosed that may be essential to
37 implementing this specification, and any offers of patent licensing terms, please refer to
38 the Intellectual Property Rights section of the WSRF TC web page (<http://www.oasis-open.org/committees/wsrf/>).

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92 1 Introduction

93 The relationship between Web services and stateful resources is defined in [WS-Resource]. This
94 relationship is described as the *WS-Resource Access Pattern*. In the WS-Resource Access
95 Pattern, messages to a Web service include a component that identifies a stateful resource to be
96 used in the execution of the message exchange. We refer to the composition of a stateful
97 resource and a Web service as a WS-Resource.

98 This specification standardizes the means by which the definition of the properties of a WS-
99 Resource may be declared as part of the Web service interface. The declaration of the WS-
100 Resource's properties represents a projection of or a *view* on the WS-Resource's state. The
101 projection is defined in terms of a resource properties document. This resource properties
102 document serves to define a basis for access to the resource properties through the Web service
103 interface.

104 This specification also defines a standard set of message exchanges that allow a requestor to
105 query or update the resource property values. The set of properties defined in the resource
106 properties document, and associated with the service interface, defines the constraints on the
107 valid contents of these message exchanges.

108 In this document, we outline the goals and requirements for resource properties. We define the
109 means to declare resource properties as part of a Web service description. Following this, we
110 define the message exchanges for querying and updating resource property values. The
111 document concludes with a discussion of security considerations, including a discussion of
112 security considerations associated with resource properties. As an appendix, we provide
113 normative XML and WSDL descriptions of resource properties.

114 WS-ResourceProperties is inspired by a portion of the Global Grid Forum's "Open Grid
115 Services Infrastructure (OGSI) Version 1.0" specification [OGSI].

116 1.1 Goals and Requirements

117 The goal of WS-ResourceProperties is to standardize the terminology, concepts, operations,
118 WSDL and XML needed to express the resource properties projection, its association with the
119 Web service interface, and the messages defining the query and update capability against the
120 properties of a WS-Resource.

121 1.1.1 Requirements

122 In meeting this goal, the specification must address the following specific requirements:

123 **This specification MUST:**

- 124 • Define the term "resource property" and its relationship to Web services and WS-Resources.
- 125 • Define the means by which a designer decorates a Web service description with the names
126 and types of properties associated with a WS-Resource.
- 127 • Define the means by which a requestor can:
 - 128 • Retrieve the values of one or more properties of a WS-Resource
 - 129 • Update the values of one or more properties of a WS-Resource
 - 130 • Query across the values of one or more properties of a WS-Resource
 - 131 • Subscribe for notification [WS-Notification] when the value of a WS-Resource property
132 changes.

133 The means by which resource property values are retrieved and updated SHOULD reflect a
134 document-oriented style and MUST provide the means to perform batched query and update

135 operations against the WS-Resource in a single message exchange. This will facilitate improved
136 performance over approaches requiring a separate request message exchange for each
137 individual resource property access.
138 Web services are often described using a collection of message exchange sets (e.g. WSDL 1.1
139 portTypes). These message exchange sets may be aggregated (using manual cut-and-paste in
140 WSDL 1.1) to form the “final” composed interface definition for the Web service. The requestor’s
141 exposure to and interpretation of the Web service interface may be defined by a partial subset of
142 the constituent message exchange sets in the overall interface composition. Therefore, a
143 requestor will form resource property-related message requests based on this potentially partial
144 understanding of the overall composed interface to the Web service. It MUST be possible for a
145 requestor, having partial knowledge of the composed service interface, to form correct and
146 consistent resource property access message requests that execute properly on a Web service
147 that implements an extended message exchange set.

148 **1.1.2 Non-Goals**

149 The following topics are outside the scope of this specification:
150 General purpose XML document query and update: This specification is not meant to be used for
151 querying and updating generic XML documents, or to be used outside the context of modeling
152 stateful resources with Web services.

153 **1.2 Notational Conventions**

154 The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD",
155 "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be
156 interpreted as described in [RFC 2119].

157 When describing abstract data models, this specification uses the notational convention used by
158 the [XML Infoset]. Specifically, abstract property names always appear in square brackets (e.g.,
159 [some property]).

160 This specification uses a notational convention, referred to as “Pseudo-schemas” in a fashion
161 similar to the WSDL 2.0 Part 1 specification [WSDL 2.0]. A Pseudo-schema uses a BNF-style
162 convention to describe attributes and elements:

- 163 • ‘?’ denotes optionality (i.e. zero or one occurrences),
- 164 • ‘*’ denotes zero or more occurrences,
- 165 • ‘+’ denotes one or more occurrences,
- 166 • ‘[’ and ‘]’ are used to form groups,
- 167 • ‘|’ represents choice.

168 Attributes are conventionally assigned a value which corresponds to their type, as defined in the
169 normative schema.

```
170 <!-- sample pseudo-schema -->
171 <element
172     required_attribute_of_type_QName="xs:QName"
173     optional_attribute_of_type_string="xs:string"? >
174     <required_element />
175     <optional_element />?
176     <one_or_more_of_these_elements />+
177     [ <choice_1 /> | <choice_2 /> ]*
178   </element>
```

179 **1.3 Namespaces**

180 The following namespaces are used in this document:

Prefix	Namespace
s12	http://www.w3.org/2003/05/soap-envelope
xsd	http://www.w3.org/2001/XMLSchema
wsa	http://schemas.xmlsoap.org/ws/2004/08/addressing
wsrf-rp	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd
wsrf-rpw	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.wsdl
wsrf-bf	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-BaseFaults-1.2-draft-04.xsd
wsrf-rw	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-Resource-1.2-draft-03.wsdl

181

2 Terminology and Concepts

The following definitions outline the terminology and usage in this specification. This section gives only brief description of these terms.

Resource Property:

- A resource property is a piece of information defined as part of the state model of a WS-Resource.
- A resource property may reflect a part of the resource's state, meta-data, manageability information, etc.

Resource Properties Document:

- The XML document representing a logical composition of resource property elements. The resource properties document defines a particular view or projection of the state data implemented by the WS-Resource.
- The type (e.g. the XML Schema definition of the root element) of a resource properties document is associated with the WSDL portType defining the Web service interface. This association is the basis of the WS-Resource definition. Each instance of a particular WS-Resource type MUST implement a logical resource properties document of the type declared in the WSDL portType.

Resource Property Element:

- The XML representation of a resource property.
- A resource property element must appear as the immediate child of the root element of a resource properties document.
- A resource property element must be an XML global element definition (GED), and is uniquely identified by QName.

Resource Property Value:

- The value(s) associated with a resource property.

207 3 Example

208 The simple example below defines the GenericDiskDrive portType and the resource properties
209 document associated with GenericDiskDrive. The association of the resource properties
210 document with the portType defines the type of the WS-Resource.

```
211 <wsdl:definitions ... xmlns:tns="http://example.com/diskDrive" ...>  
212 ...  
213 <wsdl:types>  
214   <xsd:schema targetNamespace="http://example.com/diskDrive" ... >  
215  
216     <!-- Resource property element declarations -->  
217     <xsd:element name="NumberOfBlocks" type="xsd:integer"/>  
218     <xsd:element name="BlockSize" type="xsd:integer" />  
219     <xsd:element name="Manufacturer" type="xsd:string" />  
220     <xsd:element name="StorageCapability" type="xsd:string" />  
221  
222     <!-- Resource properties document declaration -->  
223     <xsd:element name="GenericDiskDriveProperties">  
224       <xsd:complexType>  
225         <xsd:sequence>  
226           <xsd:element ref="tns:NumberOfBlocks"/>  
227           <xsd:element ref="tns:BlockSize" />  
228           <xsd:element ref="tns:Manufacturer" />  
229           <xsd:any minOccurs="0" maxOccurs="unbounded" />  
230           <xsd:element ref="tns:StorageCapability"  
231             minOccurs="0" maxOccurs="unbounded" />  
232         </xsd:sequence>  
233       </xsd:complexType>  
234     </xsd:element>  
235 ...  
236   </xsd:schema>  
237 </wsdl:types>  
238 ...  
239   <!-- Association of resource properties document to a portType -->  
240   <wsdl:portType name="GenericDiskDrive"  
241     wsrf-rp:ResourceProperties="tns:GenericDiskDriveProperties" >  
242  
243     <operation name="start" .../>  
244     <operation name="stop" .../>  
245 ...  
246   </wsdl:portType>  
247 ...  
248 </wsdl:definitions>
```

249 The following represents the request message used to retrieve two resource property elements
250 from the WS-Resource that implements the GenericDiskDrive portType:

```
251 ...  
252   <wsrf-rp:GetMultipleResourceProperties
```

```
253     xmlns:tns="http://example.com/diskdrive" ...>
254     <wsrf-rp:ResourceProperty>
255         tns:NumberOfBlocks
256     </wsrf-rp:ResourceProperty>
257     <wsrf-rp:ResourceProperty>
258         tns:BlockSize
259     </wsrf-rp:ResourceProperty>
260     <wsrf-rp:ResourceProperty>
261         tns:StorageCapability
262     </wsrf-rp:ResourceProperty>
263     </wsrf-rp:GetMultipleResourceProperties>
264     ...

```

265 The following is a sample response to the simple get request:

```
266 ...
267     <wsrf-rp:GetMultipleResourcePropertiesResponse
268         xmlns:ns1="http://example.com/diskdrive"
269         xmlns:ns2="http://example.com/capabilities" ...>
270         <ns1:NumberOfBlocks>22</ns1:NumberOfBlocks>
271         <ns1:BlockSize>1024</ns1:BlockSize>
272         <ns1:StorageCapability>
273             <ns2>NoSinglePointOfFailure>true</ns2>NoSinglePointOfFailure>
274         </ns1:StorageCapability>
275         <ns1:StorageCapability>
276             <ns2>DataRedundancyMax>42</ns2>DataRedundancyMax>
277         </ns1:StorageCapability>
278
279     </wsrf-rp:GetMultipleResourcePropertiesResponse>
280 ...

```

281 **4 Declaring Resource Properties**

282 **4.1 Resource Properties Document**

283 The resource properties document type associated with a Web service's WSDL 1.1 portType
284 definition provides the declaration of the exposed resource properties of the WS-Resource. It
285 represents a particular composed structural view or projection of the resource properties of the
286 WS-Resource, essentially exposing the stateful resource component within the WS-Resource
287 composition. This may be used by a service requestor to form an XML-based query or update
288 expression on the WS-Resource.

289 This specification does not dictate the means by which a service implements a resource
290 properties document. A given service implementation may choose to realize its implementation of
291 the resource properties document as an actual XML instance document, stored in memory, in the
292 file system, in a database or in some XML Repository. Other service implementations may
293 *dynamically* construct the resource property elements and their values, from data held in
294 programming language objects (such as a J2EE EJB Entity Bean) or by executing a command on
295 a private communications channel to a physical resource. Yet another implementation possibility
296 is a mapping layer to a standard management interface (such as CIM or SNMP).

297 There is an explicit relationship between the resource properties document and the message
298 exchanges defined in Section 5. Any Web service that implements an interface that includes a
299 resource properties document type declaration is a WS-Resource. A WS-Resource MUST accept
300 message requests declared by the GetResourceProperty message exchange defined in Section
301 5. Similarly, such a Web service MAY accept message requests declared by the other message
302 exchanges defined in Section 5.

303 However, there is no relationship, intended or implied by this specification, between the resource
304 properties defined in the resource properties document and any other message exchanges that
305 may be introduced as part of the Web service interface. Any relationships between the resource
306 properties and messages that comprise an interface are entirely under the purview of the
307 designer of that interface. For example, using the resource properties document described above
308 in Section 3, it would be legal for an interface designer to introduce a "getNumberOfBlocks"
309 message exchange. However, with respect to this specification, there is no relationship either
310 required or prohibited between such an operation and the properties declared in the resource
311 properties document.

312 **4.2 Resource Properties Document Type**

313 A *resource properties document* MUST be defined using the following rules:

- 314 1 The resource properties document MUST be a global element declaration (GED) in some
315 XML namespace. This GED defines the type of the root element of a resource properties
316 document and hence the type of the resource properties document itself.
- 317 2 The resource properties document MUST be uniquely identified by a QName.
- 318 3 The complexType defining the resource properties document MUST define element children
319 only.
- 320 4 The complexType defining the resource properties document MUST define a collection of
321 zero or more child elements, called *resource property elements*. Each child element MUST
322 be a GED.
- 323 5 The complexType defining the resource properties document MAY allow open element
324 content (xsd:any).

325 **4.3 Declaring the Resource Properties Document Type in WSDL**

326 The resource properties document definition is associated with a Web service WSDL 1.1
327 portType in the following manner:

```
328   <wsdl:definitions ...>
329     <wsdl:portType ...
330       wsrf-rp:ResourceProperties="xsd:QName"? ... >
331       ...
332     </wsdl:portType>
```

333 This definition is further constrained as follows:

334 /wsdl:portType/@wsrf-rp:ResourceProperties

335 If this attribute appears on a WSDL 1.1 portType element (using attribute extensibility
336 available in the WSDL 1.1 XML schema definition for the portType element) its value
337 MUST be a QName referring to a resource properties document as defined in Section
338 4.2.

339 Any service that implements a portType annotated with @wsrf-rp:ResourceProperties MUST be a
340 component of a WS-Resource and MUST provide the interface to resource properties via a
341 document whose root element is defined by the XML global element declaration associated with
342 the portType.

343 5 Operations on Resource Properties

344 This section defines a collection of message exchanges that standardize the means by which a
345 requestor can retrieve values of resource properties, update values of resource properties, and
346 issue queries against resource properties.

347 Any interface that includes a resource properties document type declaration
348 (/wsdl:portType/@ResourceProperties) MUST also include the GetResourceProperty message
349 exchange (operation) defined in this section. Any Web service that implements an interface that
350 includes a resource properties document type declaration MAY also support the other message
351 exchanges defined in this section.

352 5.1 GetResourcePropertyDocument

353 A WS-Resource MAY support the message exchange defined in this section that allows a

354 requestor to retrieve the values of all resource properties associated with the WS-Resource.

355 The format of this request message MUST be:

```
<wsrf-rp:GetResourcePropertyDocument />
```

357 The GetResourcePropertyDocument request message MUST follow the WS-Resource Access
358 Pattern. If a SOAPAction URI is included in the transport portion of the
359 GetResourcePropertyDocument message, it MUST contain the URI http://docs.oasis-
360 open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
361 06.wsdl/GetResourcePropertyDocument/GetResourcePropertyDocumentRequest.

362 The response of the GetResourcePropertyDocument request message is a message of the
363 following form:

```
<wsrf-rp:GetResourcePropertyDocumentResponse>  
  {any}  
</wsrf-rp:GetResourcePropertyDocumentResponse>
```

364 If a SOAPAction URI is included in the transport portion of the
365 GetResourcePropertyDocumentResponse message, it MUST contain the URI http://docs.oasis-
366 open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
367 06.wsdl/GetResourcePropertyDocument/GetResourcePropertyDocumentResponse. The
368 contents of the GetResourcePropertyDocumentResponse message are further described as
369 follows:

370 /wsrf-rp:GetResourcePropertyDocumentResponse/{any}

371 An XML element that MUST correspond to the element declared in the value of the
372 ResourceProperties attribute of the portType defining the
373 GetResourcePropertyDocument operation. The contents of the element comprise all the
374 resource property values contained in the WS-Resource's resource properties document.

375 If the WS-Resource does not respond to the GetResourcePropertyDocument request message
376 with the GetResourcePropertyDocumentResponse message, then it MUST send one of the
377 following fault messages:

378 ResourceUnknownFault

379 The resource identified in the message (which follows the WS-Resource Access Pattern) is not
380 known to the Web service. This fault is specified by the WS-Resource [WS-Resource]
381 specification.

385 Note: All faults generated must be compliant with the WS-BaseFaults [WS-BaseFaults]
386 specification.

387 **5.1.1 Example SOAP Encoding of the**
GetResponsePropertyDocument Message Exchange

389 Consider the following resource properties document defining resource properties for a WS-
390 Resource defined by the GenericDiskDrive portType:

```
391 <GenericDiskDriveProperties  
392     xmlns:tns="http://example.com/diskDrive"  
393     xmlns:cap="http://example.com/capabilities">  
394     <tns:NumberOfBlocks>22</tns:NumberOfBlocks>  
395     <tns:BlockSize>1024</tns:BlockSize>  
396     <tns:Manufacturer>DrivesRUs</tns:Manufacturer>  
397     <tns:StorageCapability>  
398         <cap>NoSinglePointOfFailure>true</cap>NoSinglePointOfFailure>  
399     </tns:StorageCapability>  
400     <tns:StorageCapability>  
401         <cap>DataRedundancyMax>42</cap>DataRedundancyMax>  
402     <tns:StorageCapability>  
403 </GenericDiskDriveProperties>
```

404 The following is a non-normative example of a GetResourcePropertyDocument request message
405 using SOAP 1.2 [SOAP 1.2]:

```
406 <s12:Envelope  
407     xmlns:s12="http://www.w3.org/2003/05/soap-envelope"  
408     xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"  
409     xmlns:wsrf-rp=  
410     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"  
411     xmlns:ex="http://example.com/exampleNS">  
412     <s12:Header>  
413         <wsa:Action>  
414             http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-  
415             06.wsdl/GetResourcePropertyDocument/GetResourcePropertyDocumentRequest  
416             </wsa:Action>  
417             <wsa:To s12:mustUnderstand="1">  
418                 http://www.provider.org/ProviderEndpoint  
419             </wsa:To>  
420             <ex:ResourceDisambiguator>  
421                 uuid:84decd55-7d3f-65ad-ac44-675d9fce5d22  
422             </ex:ResourceDisambiguator>  
423         </s12:Header>  
424         <s12:Body>  
425             <wsrf-rp:GetResourcePropertyDocument/>  
426         </s12:Body>  
427     </s12:Envelope>
```

428 The following is an example GetResourcePropertyDocumentResponse message using SOAP 1.2
429 [SOAP 1.2]:

```

430 <s12:Envelope
431   xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
432   xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
433   xmlns:wsrf-rp=
434     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
435   xmlns:resp="http://www.other.org/otherNS">
436   <s12:Header>
437     <wsa:Action>
438       http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
439       06.wsdl/GetResourcePropertyDocument/GetResourcePropertyDocumentResponse
440     </wsa:Action>
441     <wsa:To s12:mustUnderstand="1">
442       http://www.requestor.org/someEndpoint
443     </wsa:To>
444     <resp:SomeResourceRef>
445       uuid:9fef5fec-6dc3-44a2-ba32-8680cace43f9
446     </resp:SomeResourceRef>
447   </s12:Header>
448   <s12:Body>
449     <wsrf-rp:GetResourcePropertyDocumentResponse
450       xmlns:tns="http://example.com/diskDrive"
451       xmlns:cap="http://example.com/capabilities">
452       <tns:GenericDiskDriveProperties>
453         <tns:NumberOfBlocks>22</tns:NumberOfBlocks>
454         <tns:BlockSize>1024</tns:BlockSize>
455         <tns:Manufacturer>DrivesRUs</tns:Manufacturer>
456         <tns:StorageCapability>
457           <cap>NoSinglePointOfFailure>true</cap:>
458           </tns:StorageCapability>
459           <tns:StorageCapability>
460             <cap>DataRedundancyMax>42</cap:>
461             <tns:StorageCapability>
462           </GenericDiskDriveProperties>
463         </wsrf-rp:GetResourcePropertyDocumentResponse>
464       </s12:Body>
465     </s12:Envelope>

```

466 5.2 GetResourceProperty

467 A WS-Resource whose portType includes the resource properties document type declaration
 468 (/wsdl:portType/@ResourceProperties) MUST support the message exchange defined in this
 469 section that allows a requestor to retrieve the value of a single resource property of a WS-
 470 Resource.

471 The format of this request message MUST be:

```

472
473   <wsrf-rp:GetResourceProperty>
474     QName
475   </wsrf-rp:GetResourceProperty>
476

```

477 The GetResourceProperty request message MUST follow the WS-Resource Access Pattern. If a
478 SOAPAction URI is included in the transport portion of the GetResourceProperty message, it
479 MUST contain the URI <http://docs.oasis-open.org/wsrp/2005/03/wsrp-WS-ResourceProperties-1.2-draft-06.wsdl>/GetResourceProperty/GetResourcePropertyRequest.
480
481 The components of the GetResourceProperty request message are further described as follows:
482 /wsrf-rp:GetResourceProperty/QName
483 This MUST correspond to the QName of a resource property element child of the root of
484 the WS-Resource's resource properties document.
485 The response of the GetResourceProperty request message is a message of the following form:
486
487 <wsrf-rp:GetResourcePropertyResponse>
488 {any}*
489 </wsrf-rp:GetResourcePropertyResponse>
490
491 If a SOAPAction URI is included in the transport portion of the GetResourcePropertyResponse
492 message, it MUST contain the URI <http://docs.oasis-open.org/wsrp/2005/03/wsrp-WS-ResourceProperties-1.2-draft-06.wsdl>/GetResourceProperty/GetResourcePropertyResponse.
493 The contents of the GetResourceProperty response message are further described as follows:
494 /wsrf-rp:GetResourcePropertyResponse/{any}
495 The resource property value, as an XML element, that corresponds to the QName in the
496 GetResourceProperty request. Note: in the case where the resource property element is
497 defined with minOccurs="0" and the resource properties document does not contain any
498 value for that resource property, the response MUST be an empty wsrf-rp:GetResourcePropertyResponse element.
499
500 501 If the WS-Resource does not respond to the GetResourceProperty request message with the
502 GetResourcePropertyResponse message, then it MUST send one of the following fault
503 messages:
504 ResourceUnknownFault

- The resource identified in the message (which follows the WS-Resource Access Pattern) is not known to the Web service. This fault is specified by the WS-Resource [WS-Resource] specification.

505 508 InvalidResourcePropertyName

- The QName in the request message did not correspond to a resource property element of the WS-Resource referred to in the request message.

509 511 Note: All faults generated must be compliant with the WS-BaseFaults [WS-BaseFaults] specification.
512

5.2.1 Example SOAP Encoding of the GetResourceProperty Message Exchange

515 Consider the following resource properties document defining resource properties for a WS-
516 Resource defined by the GenericDiskDrive portType:

```
517 <GenericDiskDriveProperties  
518     xmlns:tns="http://example.com/diskDrive"  
519     xmlns:cap="http://example.com/capabilities">
```

```
520 <tns:NumberOfBlocks>22</tns:NumberOfBlocks>
521 <tns:BlockSize>1024</tns:BlockSize>
522 <tns:Manufacturer>DrivesRUs</tns:Manufacturer>
523 <tns:StorageCapability>
524 <cap>NoSinglePointOfFailure>true</cap>NoSinglePointOfFailure>
525 </tns:StorageCapability>
526 <tns:StorageCapability>
527 <cap>DataRedundancyMax>42</cap>DataRedundancyMax>
528 </tns:StorageCapability>
529 </GenericDiskDriveProperties>
```

530 The following is a non-normative example of a GetResourceProperty request message using
531 SOAP 1.2 [SOAP 1.2]:

```
532 <s12:Envelope
533   xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
534   xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
535   xmlns:wsrf-rp=
536   "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
537   xmlns:ex="http://example.com/exampleNS">
538   <s12:Header>
539     <wsa:Action>
540       http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
541       06.wsdl/GetResourceProperty/GetResourcePropertyRequest
542     </wsa:Action>
543     <wsa:To s12:mustUnderstand="1">
544       http://www.provider.org/ProviderEndpoint
545     </wsa:To>
546     <ex:ResourceDisambiguator>
547       uuid:84decd55-7d3f-65ad-ac44-675d9fce5d22
548     </ex:ResourceDisambiguator>
549   </s12:Header>
550   <s12:Body>
551     <wsrf-rp:GetResourceProperty
552       xmlns:tns="http://example.com/diskDrive">
553       tns:NumberOfBlocks
554     </wsrf-rp: GetResourceProperty>
555   </s12:Body>
556 </s12:Envelope>
```

557 The following is an example GetResourcePropertyResponse message using SOAP 1.2 [SOAP
558 1.2]:

```
559 <s12:Envelope
560   xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
561   xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
562   xmlns:wsrf-rp=
563   "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
564   xmlns:resp="http://www.other.org/otherNS">
565   <s12:Header>
566     <wsa:Action>
```

```
567 http://docs.oasis-open.org/wsrfs/2005/03/wsrfs-WS-ResourceProperties-1.2-draft-
568
569     </wsa:Action>
570     <wsa:To s12:mustUnderstand="1">
571         http://www.requestor.org/someEndpoint
572     </wsa:To>
573     <resp:SomeResourceRef>
574         uuid:9fef5fec-6dc3-44a2-ba32-8680cace43f9
575     </resp:SomeResourceRef>
576     </s12:Header>
577     <s12:Body>
578         <wsrf-rp:GetResourcePropertyResponse
579             xmlns:ns1="http://example.com/diskDrive">
580             <ns1:NumberOfBlocks>22</ns1:NumberOfBlocks>
581         </wsrf-rp:GetResourcePropertyResponse>
582     </s12:Body>
583 </s12:Envelope>
```

5.3 GetMultipleResourceProperties

584 A WS-Resource MAY support the message exchange defined in this section that allows a
585 requestor to retrieve the values of multiple resource properties of a WS-Resource.

586 The format of this request message MUST be:

```
587     <wsrf-rp:GetMultipleResourceProperties>
588         <wsrf-rp:ResourceProperty>QName <wsrf-rp:ResourceProperty>+
589     </wsrf-rp:GetMultipleResourceProperties>
```

590 The GetMultipleResourceProperties request message MUST follow the WS-Resource Access
591 Pattern.. If a SOAPAction URI is included in the transport portion of the
592 GetMultipleResourceProperties message, it MUST contain the URI http://docs.oasis-
593 open.org/wsrfs/2005/03/wsrfs-WS-ResourceProperties-1.2-draft-
594 06.wsdl/GetMultipleResourceProperties/GetMultipleResourcePropertiesRequest.

595 The components of the GetMultipleResourceProperties request message are further described as
596 follows:

597 /wsrf-rp:GetMultipleResourceProperties/wsrf-rp:ResourceProperty+
598 This component MAY appear one or more times. Each ResourceProperty element
599 contains an xsd:QName which MUST correspond to the QName of a resource property
600 element child of the root of the WS-Resource's resource properties document.

601 The response of the GetMultipleResourceProperties request message is a message of the
602 following form:

```
603     <wsrf-rp:GetMultipleResourcePropertiesResponse>
604         {any}*
605     </wsrf-rp:GetMultipleResourcePropertiesResponse>
```

606 If a SOAPAction URI is included in the transport portion of the
607 GetMultipleResourcePropertiesResponse message, it MUST contain the URI http://docs.oasis-
608 open.org/wsrfs/2005/03/wsrfs-WS-ResourceProperties-1.2-draft-

610 06.wsdl/GetMultipleResourceProperties/GetMultipleResourcePropertiesResponse. The contents
611 of the GetMultipleResourcePropertiesResponse message are further described as follows:
612 /wsrf-rp:GetMultipleResourcePropertiesResponse/{any}
613 A collection of resource property values, as XML elements that correspond to the
614 QNames given in the GetMultipleResourceProperties request message. This collection is
615 formed in the following fashion. For each QName in the request message, the resource
616 must add to the collection all child elements of the root of the resource properties
617 document whose name corresponds to that QName. Note: in the case where the
618 resource property element is defined with minOccurs="0" and the resource properties
619 document does not contain any value for that resource property, no child element is
620 added to the collection for that QName.
621 If the XML schema definition of the resource properties document root element does not
622 permit the root element to contain a child element with that QName the processing of the
623 GetMultipleResourceProperties request message MUST terminate with a fault message.
624 The collection of resource property values SHOULD be formed in the same order as the
625 resource property element QNames were specified in the GetMultipleResourceProperties
626 request message.
627 If the WS-Resource does not respond to the GetMultipleResourceProperties request message
628 with the GetMultipleResourcePropertiesResponse message, then it MUST send one of the
629 following fault messages:
630 ResourceUnknownFault

- The resource identified in the message (which follows the WS-Resource Access Pattern)
631 is not known to the Web service. This fault is specified by the WS-Resource [WS-
632 Resource] specification.

634 InvalidResourcePropertyQName

- One or more of the QNames in the request message did not correspond to a resource
635 property element of the WS-Resource referred to in the request message.

637 Note: All faults generated must be compliant with the WS-BaseFaults [WS-BaseFaults]
638 specification.
639 Note: the functionality provided by the GetResourceProperty message exchange is a strict subset
640 of that provided by GetMultipleResourceProperties. WS-ResourceProperties defines two
641 message exchange sets to provide implementation flexibility. GetResourceProperty is a simple,
642 required message exchange that allows simple Web service implementations to be compliant
643 with WS-ResourceProperties. The optional GetMultipleResourceProperties, while more
644 sophisticated, allows efficient retrieval of multiple resource property values using a single
645 message exchange.
646 An example use of the GetMultipleResourceProperties operation is shown in Section 3. Note: it is
647 the responsibility of the requestor to correlate the elements of the response message that
648 correspond to the QNames contained in the request message.

649 **5.3.1 Example SOAP Encoding of the GetMultipleResourceProperties
650 Message Exchange**

651 Consider the following resource properties document defining resource properties for a WS-
652 Resource defined by the GenericDiskDrive portType:

653 <GenericDiskDriveProperties

```
654     xmlns:tns="http://example.com/diskDrive"
655     xmlns:cap="http://example.com/capabilities">
656     <tns:NumberOfBlocks>22</tns:NumberOfBlocks>
657     <tns:BlockSize>1024</tns:BlockSize>
658     <tns:Manufacturer>DrivesRUs</tns:Manufacturer>
659     <tns:StorageCapability>
660         <cap>NoSinglePointOfFailure>true</cap>NoSinglePointOfFailure>
661     </tns:StorageCapability>
662     <tns:StorageCapability>
663         <cap>DataRedundancyMax>42</cap>DataRedundancyMax>
664     </tns:StorageCapability>
665 </GenericDiskDriveProperties>
```

666 The following is a non-normative example of a GetMultipleResourceProperties request message
667 using SOAP 1.2 [SOAP 1.2]:

```
668 <s12:Envelope
669     xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
670     xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
671     xmlns:wsrf-rp=
672     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
673     xmlns:ex="http://example.com/exampleNS">
674     <s12:Header>
675         <wsa:Action>
676             http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
677             06.wsdl/GetMultipleResourceProperties/GetMultipleResourcePropertiesRequest
678         </wsa:Action>
679         <wsa:To s12:mustUnderstand="1">
680             http://www.provider.org/ProviderEndpoint
681         </wsa:To>
682         <ex:ResourceDisambiguator>
683             uuid:84decd55-7d3f-65ad-ac44-675d9fce5d22
684         </ex:ResourceDisambiguator>
685     </s12:Header>
686     <s12:Body>
687         <wsrf-rp:GetMultipleResourceProperties
688             xmlns:tns="http://example.com/diskdrive">
689             <wsrf-rp:ResourceProperty>
690                 tns:NumberOfBlocks
691             </wsrf-rp:ResourceProperty>
692             <wsrf-rp:ResourceProperty>
693                 tns:BlockSize
694             </wsrf-rp:ResourceProperty>
695         </wsrf-rp:GetMultipleResourceProperties>
696     </s12:Body>
697 </s12:Envelope>
```

698 The following is an example GetMultipleResourcePropertiesResponse message using SOAP 1.2
699 [SOAP 1.2]:

```
700 <s12:Envelope
```

```

701     xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
702     xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
703     xmlns:wsrf-rp=
704     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
705     xmlns:resp="http://www.other.org/otherNS">
706     <s12:Header>
707         <wsa:Action>
708             http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
709             06.wsdl/GetMultipleResourceProperties/GetMultipleResourcePropertiesResponse
710             </wsa:Action>
711             <wsa:To s12:mustUnderstand="1">
712                 http://www.requestor.org/someEndpoint
713             </wsa:To>
714             <resp:SomeResourceRef>
715                 uuid:9fef5fec-6dc3-44a2-ba32-8680cace43f9
716             </resp:SomeResourceRef>
717         </s12:Header>
718         <s12:Body>
719             <wsrf-rp:GetMultipleResourcePropertiesResponse
720                 xmlns:ns1="http://example.com/diskdrive" ...>
721                 <ns1:NumberOfBlocks>22</ns1:NumberOfBlocks>
722                 <ns1:BlockSize>1024</ns1:BlockSize>
723             </wsrf-rp:GetMultipleResourcePropertiesResponse>
724         </s12:Body>
725     </s12:Envelope>

```

5.4 QueryResourceProperties

A WS-Resource MAY support the message exchange defined in this section that allows a requestor to query the resource properties document of a WS-Resource using a query expression such as XPath [XPath].

The format of this request message MUST be:

```

731     <wsrf-rp:QueryResourceProperties>
732         <wsrf-rp:QueryExpression Dialect="URI">
733             xsd:any
734         </wsrf-rp:QueryExpression>
735     </wsrf-rp:QueryResourceProperties>

```

The QueryResourceProperties request message MUST follow the WS-Resource Access Pattern. If a SOAPAction URI is included in the transport portion of the QueryResourceProperties message, it MUST contain the URI <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.wsdl/QueryResourceProperties/QueryResourcePropertiesRequest>.

The components of the QueryResourceProperties request message are further described as follows:

/wsrf-rp:QueryResourceProperties/wsrf-rp:QueryExpression

The context of the expression is to be evaluated against the resource properties document of the WS-Resource identified by the request. The results of evaluating the QueryExpression are returned in the response to this request message.

747 /wsrf-rp:QueryResourceProperties/wsrf-rp:QueryExpression/@Dialect
748 This attribute contains a URI specifying the type of expression contained by the element.
749 If the implementation does not recognize the URI identified by @Dialect, it MUST fault.
750 There are two well known dialects identified by this specification, corresponding to two
751 versions of the XPath language.
752 <http://www.w3.org/TR/1999/REC-xpath-19991116>
753 This URI identifies the XPath 1.0 language. The contents of the
754 QueryExpression MUST be a string containing a valid XPath 1.0
755 expression.
756 <http://www.w3.org/TR/2003/WD-xpath20-20031112>
757 This URI identifies the Xpath 2.0 (working draft) language. The contents
758 of the QueryExpression MUST be a string containing a valid XPath 2.0
759 expression. Note: an additional URI will be added to represent the W3C
760 Recommendation form of the XPath 2.0 language.
761 For XPath dialects, the namespace URI prefixes for the in-scope namespace
762 declarations of the QueryResourceProperties element may be used in the XPath
763 expression. The actual namespace declaration may be on any of the ancestors of the
764 QueryResourceProperty element.
765 Note: it is RECOMMENDED that users avoid the use of previously-defined namespace
766 prefixes when there is a chance the message could traverse intermediaries or when
767 encryption is applied to the message, as there is a chance that an intermediary will
768 modify the namespace prefixes. In such cases the expression will become incoherent
769 with respect to the namespace prefix to namespace URI mapping intended by the
770 requestor.
771 /wsrf-rp:QueryResourceProperties/QueryExpression/{any}
772 The QueryExpression MUST contain an expression in an expression language specified
773 by the dialect attribute. Note: this element may contain mixed content.
774 The response of the QueryResourceProperties request message MUST be a message of the
775 following form:
776 <wsrf-rp:QueryResourcePropertiesResponse>
777 {any}
778 </wsrf-rp:QueryResourcePropertiesResponse>
779 If a SOAPAction URI is included in the transport portion of the
780 QueryResourcePropertiesResponse message, it MUST contain the URI <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.wsdl/QueryResourceProperties/QueryResourcePropertiesResponse>. The contents of the
781 QueryResourcePropertiesResponse message are further described as follows:
782 /wsrf-rp:QueryResourcePropertiesResponse/{any}
783 The response of the QueryResourceProperties request is variable, depending on the
784 nature of the QueryExpression component of the QueryResourceProperties request. The
785 response MUST contain an XML serialization of the results of evaluating the
786 QueryExpression against the resource properties document. Note: this element has
787 mixedContent, to allow for the case where the QueryExpression evaluates to a simple
788 type (such as a Boolean, a string or an integer) as well as the case where a node-set of
789 elements is returned.
790
791

792 If the WS-Resource does not respond to the QueryResourceProperties request message with the
793 QueryResourcePropertiesResponse message, then it MUST send one of the following fault
794 messages:

795 ResourceUnknownFault

- 796 • The resource identified in the message (which follows the WS-Resource Access Pattern)
797 is not known to the Web service. This fault is specified by the WS-Resource [WS-
798 Resource] specification.

799 UnknownQueryExpressionDialect

- 800 • The given QueryExpression has a dialect that is unknown to the Web service.

801 InvalidQueryExpression

- 802 • The given Query Expression is not valid within the QueryExpression language identified
803 by the dialect attribute.

804 QueryEvaluationError

- 805 • The Query Expression failed during evaluation.

806 Note: All faults generated must be compliant with the WS-BaseFaults [WS-BaseFaults]
807 specification.

808 **5.4.1 QueryExpressionDialect Resource Property**

809 When a portType includes the definition of the QueryResourceProperties operation, it MUST also
810 include a reference to the wsrf-rp:QueryExpressionDialect Resource Property. The form of the
811 wsrf-rp:QueryExpressionDialect Resource Property is:

```
812 <wsrf-rp:QueryExpressionDialect>  
813   xsd:anyURI  
814 </wsrf-rp:QueryExpressionDialect>
```

815

816 This resource property element is further constrained as follows:

817 /wsrf-rp:QueryExpressionDialect

818 This resource property declares one or more QueryExpression dialects that are
819 supported by the Web service. This resource property must be referenced with
820 minOccurs="1" and maxOccurs="unbounded".

821 /wsrf-rp:QueryExpressionDialect/{anyURI}

822 If a requestor sends a QueryResourceProperties request message, using a
823 QueryExpression with Dialect matching the URI contained in this resource property
824 element, the WS-Resource MUST NOT issue an *UnknownQueryExpressionDialect* fault.
825 The value of this element is a URI that MUST correspond to a QueryExpression dialect.

826 **5.4.2 Example SOAP Encoding of the QueryResourceProperties 827 Message Exchange**

828 Consider the following resource properties document defining resource properties for a WS-
829 Resource defined by the GenericDiskDrive portType:

```
830 <GenericDiskDriveProperties  
831   xmlns:tns="http://example.com/diskDrive"  
832   xmlns:cap="http://example.com/capabilities">
```

```
833 <tns:NumberOfBlocks>22</tns:NumberOfBlocks>
834 <tns:BlockSize>1024</tns:BlockSize>
835 <tns:Manufacturer>DrivesRUs</tns:Manufacturer>
836 <tns:StorageCapability>
837   <cap>NoSinglePointOfFailure>true</cap>NoSinglePointOfFailure>
838 </tns:StorageCapability>
839 <tns:StorageCapability>
840   <cap>DataRedundancyMax>42</cap>DataRedundancyMax>
841 </tns:StorageCapability>
842 </GenericDiskDriveProperties>
```

843 The following is a non-normative example of a QueryResourceProperties request message using
844 SOAP 1.2 [SOAP 1.2]:

```
845 <s12:Envelope
846   xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
847   xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
848   xmlns:wsrf-rp=
849 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
850   xmlns:ex="http://example.com/exampleNS">
851   <s12:Header>
852     <wsa:Action>
853       http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
854       06.wsdl/QueryResourceProperties/QueryResourcePropertiesRequest
855     </wsa:Action>
856     <wsa:To s12:mustUnderstand="1">
857       http://www.provider.org/ProviderEndpoint
858     </wsa:To>
859     <ex:ResourceDisambiguator>
860       uuid:84decd55-7d3f-65ad-ac44-675d9fce5d22
861     </ex:ResourceDisambiguator>
862   </s12:Header>
863   <s12:Body>
864     <wsrf-rp:QueryResourceProperties>
865       <wsrf-rp:QueryExpression
866         Dialect="http://www.w3.org/TR/1999/REC-xpath-19991116" >
867           boolean(/*/NumberOfBlocks > 20 and /*/BlockSize=1024)
868         </wsrf-rp:QueryExpression>
869       </wsrf-rp:QueryResourceProperties>
870     </s12:Body>
871   </s12:Envelope>
```

872 The following is an example QueryResourcePropertiesResponse message using SOAP 1.2
873 [SOAP 1.2], containing the results of evaluating that XPath expression against the root element of
874 the resource's resource properties document:

```
875 <s12:Envelope
876   xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
877   xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
878   xmlns:wsrf-rp=
879 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
```

```
880     xmlns:resp="http://www.other.org/otherNS">
881     <s12:Header>
882       <wsa:Action>
883         http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
884         06.wsdl/QueryResourceProperties/QueryResourcePropertiesResponse
885       </wsa:Action>
886       <wsa:To s12:mustUnderstand="1">
887         http://www.requestor.org/someEndpoint
888       </wsa:To>
889       <resp:SomeResourceRef>
890         uuid:9fef5fec-6dc3-44a2-ba32-8680cace43f9
891       </resp:SomeResourceRef>
892     </s12:Header>
893     <s12:Body>
894       <wsrf-rp:QueryResourcePropertiesResponse>
895         true
896       </wsrf-rp:QueryResourcePropertiesResponse>
897     </s12:Body>
898   </s12:Envelope>
```

899 **5.5 PutResourcePropertyDocument**

900 The PutResourcePropertyDocument message exchange allows a requestor to completely replace
901 the values of a WS-Resource's properties with an entirely new resource property document. This
902 message exchange is symmetric to the GetResourcePropertyDocument message exchange
903 defined in Section 5.1.

904 The format of the PutResourcePropertyDocument request message MUST be:

```
905   <wsrf-rp:PutResourcePropertyDocument>
906     {any}
907   </wsrf-rp:PutResourcePropertyDocument>
```

908 The PutResourcePropertyDocument request message MUST follow the WS-Resource Access
909 Pattern. If a SOAPAction URI is included in the transport portion of the
910 PutResourcePropertyDocument message, it MUST contain the URI http://docs.oasis-
911 open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
912 06.wsdl/PutResourcePropertyDocument/PutResourcePropertyDocumentRequest. The contents
913 of the PutResourcePropertyDocument request message are further described as follows:
914 /wsrf-rp:PutResourcePropertyDocument/{any}

915 An XML element that MUST correspond to the element declared in the value of the
916 ResourceProperties attribute of the portType defining the PutResourcePropertyDocument
917 operation. This is the value the requestor intends to be the new resource property
918 document for the WS-Resource.

919 The response of the PutResourcePropertyDocument request message is a message of the
920 following form:

```
921   <wsrf-rp:PutResourcePropertyDocumentResponse>
922     {any} ?
923   </wsrf-rp:PutResourcePropertyDocumentResponse>
```

924 If a SOAPAction URI is included in the transport portion of the
925 PutResourcePropertyDocumentResponse message, it MUST contain the URI <http://docs.oasis-open.org/wsrfs/2005/03/wsrfs-WS-ResourceProperties-1.2-draft-06.wsdl/PutResourcePropertyDocument/PutResourcePropertyDocumentResponse>. The contents
926 of the PutResourcePropertyDocumentResponse message are further described as follows:
927
928 /wsrf-rp:PutResourcePropertyDocumentResponse/{any}
929
930 If, after processing the PutResourcePropertyDocument request, the XML InfoSet of the
931 WS-Resource's resource properties document is identical to the XML InfoSet of the
932 contents of the PutResourcePropertyDocument request itself, then the contents of the
933 PutResourcePropertyDocumentResponse MUST be empty.
934
935 If, after processing the PutResourcePropertyDocument request, the XML InfoSet of the
936 WS-Resource's resource properties document is *not* identical to the XML InfoSet of the
937 contents of the PutResourcePropertyDocument request itself, then the contents of the
938 PutResourcePropertyDocumentResponse MUST contain the updated resource property
document.
939
940 If the WS-Resource does not respond to the PutResourcePropertyDocument request message
941 with the PutResourcePropertyDocumentResponse message, then it MUST fault. If the request
942 results in a fault for any reason, such as read-only property changed or some other update fault,
943 none of the resource properties are modified and it MAY respond with one of the following fault
messages:
944
945 ResourceUnknownFault:
946 • The resource identified in the message (which follows the WS-Resource Access Pattern)
947 is not known to the Web service. This fault is specified by the WS-Resource [WS-
948 Resource] specification.
949
950 UnableToPutResourcePropertyDocument:
951 • The WS-Resource was unable to complete the processing of the
952 PutResourcePropertyDocument for some reason.

951 Note: All faults generated must be compliant with the WS-BaseFaults [WS-BaseFaults]
952 specification.

953 5.5.1 Example SOAP Encoding of the 954 PutResourcePropertyDocument Message Exchange

955 Consider the following resource properties document defining resource properties for a WS-
956 Resource defined by the GenericDiskDrive portType:

```
957 <GenericDiskDriveProperties  
958     xmlns:tns="http://example.com/diskDrive">  
959     <tns:NumberOfBlocks>22</tns:NumberOfBlocks>  
960     <tns:BlockSize>1024</tns:BlockSize>  
961     <tns:Manufacturer>DrivesRUs</tns:Manufacturer>  
962     <tns:DriveIdentifier>ABC123</tns:DriveIdentifier>  
963 </GenericDiskDriveProperties>
```

964 The following is a non-normative example of a PutResourcePropertyDocument request message
965 using SOAP 1.2 [SOAP 1.2]:

```
966 <s12:Envelope  
967     xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
```

```
968     xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
969     xmlns:wsrf-rp=
970     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
971     xmlns:ex="http://example.com/exampleNS">
972     <s12:Header>
973         <wsa:Action>
974             http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
975             06.wsdl/PutResourcePropertyDocument/PutResourcePropertyDocumentResponseRequest
976             </wsa:Action>
977             <wsa:To s12:mustUnderstand="1">
978                 http://www.provider.org/ProviderEndpoint
979             </wsa:To>
980             <ex:ResourceDisambiguator>
981                 uuid:84dec55-7d3f-65ad-ac44-675d9fce5d22
982             </ex:ResourceDisambiguator>
983         </s12:Header>
984         <s12:Body>
985             <wsrf-rp:PutResourcePropertyDocument>
986                 <abc:GenericDiskDriveProperties
987                     xmlns:abc="http://example.com/diskDrive">
988                     <abc:NumberOfBlocks>22</abc:NumberOfBlocks>
989                     <abc:BlockSize>1024</abc:BlockSize>
990                     <abc:Manufacturer>DrivesRUs</abc:Manufacturer>
991                     <abc:DriveIdentifier>ABC123</abc:DriveIdentifier>
992                     </abc:GenericDiskDriveProperties>
993                 </wsrf-rp:PutResourcePropertyDocument>
994             </s12:Body>
995         </s12:Envelope>
```

996 The following is an example PutResourcePropertyDocumentResponse message using SOAP 1.2
997 [SOAP 1.2]:

```
998     <s12:Envelope
999         xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
1000         xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
1001         xmlns:wsrf-rp=
1002         "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
1003         xmlns:resp="http://www.other.org/otherNS">
1004         <s12:Header>
1005             <wsa:Action>
1006                 http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
1007                 06.wsdl/PutResourcePropertyDocument/PutResourcePropertyDocumentResponse
1008                 </wsa:Action>
1009                 <wsa:To s12:mustUnderstand="1">
1010                     http://www.requestor.org/someEndpoint
1011                 </wsa:To>
1012                 <resp:SomeResourceRef>
1013                     uuid:9fef5fec-6dc3-44a2-ba32-8680cace43f9
1014                 </resp:SomeResourceRef>
1015             </s12:Header>
```

```
1016 <s12:Body>
1017   <wsrf-rp:PutResourcePropertyDocumentResponse />
1018 </s12:Body>
1019 </s12:Envelope>
```

1020 **5.6 SetResourceProperties**

1021 A WS-Resource MAY support the message exchange defined in this section that allows a
1022 requestor to modify the values of multiple resource properties of a WS-Resource.

1023 The SetResourceProperties message allows the processing of a single request message to make
1024 multiple changes to the resource properties document. There are three types of changes, each
1025 modeled as separate types of component (called SetRequestComponent) of a
1026 SetResourceProperties request message:

- 1027 • Insert: wherein a new resource property element is inserted into the resource properties
1028 document;
- 1029 • Update: wherein existing resource property element(s) are modified; and
- 1030 • Delete: wherein existing resource property element(s) are removed.

1031 The format of this request message MUST be:

```
1032 <wsrf-rp:SetResourceProperties>
1033 {
1034   <wsrf-rp:Insert >
1035   {any}*
1036   </wsrf-rp:Insert> |
1037
1038   <wsrf-rp:Update >
1039   {any}*
1040   </wsrf-rp:Update> |
1041
1042   <wsrf-rp:Delete ResourceProperty="QName" />
1043 }+
1044 </wsrf-rp:SetResourceProperties>
```

1045 The SetResourceProperties request message MUST follow the WS-Resource Access Pattern. If
1046 a SOAPAction URI is included in the transport portion of the SetResourceProperties message, it
1047 MUST contain the URI <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.wsdl/SetResourceProperties/SetResourcePropertiesRequest>.

1049 The contents of the SetResourceProperties request message are further described as follows:
1050 /wsrf-rp:SetResourceProperties

1051 This element contains a collection of one or more components called
1052 SetRequestComponents. Each of the SetRequestComponents must be processed
1053 against the WS-Resource's resource properties document. These
1054 SetRequestComponents MUST appear to be processed in the order in which they are
1055 listed in the request. Each request component MUST be processed to completion in this
1056 conceptual sequence before a subsequent SetRequestComponent is processed. The
1057 result of processing a given SetRequestComponent MUST be observable to the
1058 processing of a subsequent SetRequestComponent, and to subsequent message
1059 exchanges with the same WS-Resources.

1060 If a service fails to process a SetRequestComponent, it MUST cease processing the
1061 SetResourceProperties request message. The values of the resource properties
1062 associated with this SetRequestComponent MAY reflect partial processing of this
1063 SetRequestComponent. An implementation MAY restore the contents of the resource
1064 properties document to a state as if no processing of the failed SetRequestComponent
1065 had occurred. The implementation MAY additionally choose to restore the resource
1066 properties document as if none of the SetRequestComponents had been processed.
1067 Refer to Section 7 for additional information of resource recovery.

1068 /wsrf-rp:SetResourceProperties/wsrf-rp:Insert
1069 The intent of this component is to insert the contents of the component into the resource
1070 properties document. The exact placement of the element insertion is implementation-
1071 dependent. If, as a result of processing the Insert component, the resource properties
1072 document is no longer able to validate, the processing of the component MUST fault. The
1073 implementation may be unable to accept the insertion of an element because it does not
1074 allow the requestor to insert a resource property (or its value) of that given name. In such
1075 circumstances, the resource MUST fault the processing of the component.

1076 /wsrf-rp:SetResourceProperties/wsrf-rp:Insert/{any}
1077 This component identifies the element(s) to be inserted into the resource properties
1078 document. If there are multiple child elements of the Insert component, each MUST have
1079 the same namespace and name (i.e. the same QName). The QName MUST correspond
1080 to the QName of a resource property element associated with the WS-Resource (i.e. an
1081 element that is a valid child element of the root element of the resource properties
1082 document). Note, for those resource properties documents that allow open element
1083 content, the set of valid content types can be very large.

1084 /wsrf-rp:SetResourceProperties/wsrf-rp:Update
1085 The intent of this component is to change the value of the resource property by removing
1086 any and all resource property element(s) of the given QName and replacing them with
1087 the contents of this component. If, as a result of processing the Update component, the
1088 resource properties document is no longer able to validate, the processing of the
1089 component MUST fault. The resource may be unable to accept the update of an element
1090 because it does not allow the requestor to update a resource property (or its value) of
1091 that given name. In such circumstances, the resource MUST fault the processing of the
1092 component.

1093 /wsrf-rp:SetResourceProperties/wsrf-rp:Update/{any}
1094 This identifies the element(s) to be inserted into the resource properties document,
1095 replacing all element children of the root of the resource properties document with the
1096 same QName. If there are multiple child elements of the Insert component, each MUST
1097 have the same namespace and name (i.e. the same QName). The QName MUST
1098 correspond to the QName of a resource property element associated with the WS-
1099 Resource (i.e. an element that is a valid child element of the root element of the resource
1100 properties document). Note, for those resource properties documents that allow open
1101 element content, the set of valid content types can be very large.

1102 /wsrf-rp:SetResourceProperties/wsrf-rp:Delete
1103 The intent of this component is to remove all element children of the root of the resource
1104 properties document whose QNames correspond to the value of @ResourceProperty. If
1105 the resource is unable to remove all identified elements, the processing of the component

1106 MUST fault. If, as a result of processing the Delete component, the resource properties
1107 document is no longer able to validate, the processing of the component MUST fail. The
1108 resource may be unable to accept the delete of an element because it does not allow the
1109 requestor to delete a resource property (or its value) of the given name. In such
1110 circumstances, the resource MUST fault the processing of the component.

1111 /wsrf-rp:SetResourceProperties/wsrf-rp:Delete/@ResourceProperty

1112 This attribute contains the QName of a resource property to be deleted by this
1113 component.

1114 The response of the SetResourceProperties request message, all of whose components were
1115 successfully processed, MUST be a message of the following form:

```
<wsrf-rp:SetResourcePropertiesResponse>
</wsrf-rp:SetResourcePropertiesResponse>
```

1116 If a SOAPAction URI is included in the transport portion of the
1117 QueryResourcePropertiesResponse message, it MUST contain the URI http://docs.oasis-
1118 open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
1119 06.wsdl/SetResourceProperties/SetResourcePropertiesResponse.

1120 If the WS-Resource does not respond to the SetResourceProperties request message with the
1121 SetResourcePropertiesResponse message, then it MUST send one of the following fault
1122 messages. For those faults associated with failure to process a SetResourceProperties request
1123 component, the offending component MUST be identified in the fault message:

1124 ResourceUnknownFault

- The resource identified in the message (which follows the WS-Resource Access Pattern)
1125 is not known to the Web service. This fault is specified by the WS-Resource [WS-
1126 Resource] specification.

1127 InvalidSetResourcePropertiesRequestContent:

- The contents of the SetResourceProperties request component causes the resource
1128 properties document to no longer validate.

1129 UnableToModifyResourceProperty:

- A resource property identified by one of the SetResourceProperties request components
1130 is read-only.

1131 InvalidResourcePropertyQName:

- A resource property QName does not identify a proper number of resource properties.

1132 SetResourcePropertyRequestFailed

1133 One or more components of the SetResourceProperties request failed.

1134 Note: All faults generated must be compliant with the WS-BaseFaults [WS-BaseFaults]
1135 specification.

1136 Any fault message indicating a failure during the update of the resource properties document
1137 MUST also indicate whether the document was restored or not by using the
1138 ResourcePropertyChangeFailure element of the fault. This fault element indicates the resource
1139 property element change associated with the fault and indicates if the resource property
1140 document as a whole was restored. The format of this element is indicated as follows:

```
<wsrf-rp:ResourcePropertyChangeFailure Restored=xsd:boolean?>
<wsrf-rp:CurrentValue>{any}*</wsrf-rp:CurrentValue> ?
```

```
1149     <wsrf-rp:RequestedValue>{any}*</wsrf-rp:RequestedValue> ?
1150     </wsrf-rp:ResourcePropertyChangeFailure>
1151 This element is further constrained as follows:
1152 /wsrf-rp:ResourcePropertyChangeFailure
1153     The contents of this element provide more information about the element associated with
1154     a failed modification to a resource property document.
1155 /wsrf-rp:ResourcePropertyChangeFailure/@Restored
1156     If the value of this optional attribute is "true", then the resource property document was
1157     restored to its state prior to the attempt to process the request message. The absence of
1158     this attribute is identical to this attribute having the value "false", indicating that no attempt
1159     was made to restore the resource property document.
1160 /wsrf-rp:ResourcePropertyChangeFailure/wsrf-rp:CurrentValue
1161     If present, this component contains the current value(s) of the resource property
1162     elements associated with the fault.
1163 /wsrf-rp:ResourcePropertyChangeFailure/wsrf-rp:RequestedValue
1164     If present, this component contains the value(s) of the resource property elements
1165     associated with the fault as found within the request message.
1166 Note: There is no isolation policy implied, for either modifications to the resource properties
1167 document resulting from the processing of the request or the modifications implemented by the
1168 restore. See Section 7 for more discussion.
```

1169 5.6.1 Example SOAP Encoding of the SetResourceProperties 1170 Message Exchange

1171 Consider the following resource properties document defining resource properties for a WS-
1172 Resource defined by the GenericDiskDrive portType:

```
1173 <GenericDiskDriveProperties
1174     xmlns:tns="http://example.com/diskDrive"
1175     xmlns:cap="http://example.com/capabilities">
1176     <tns:NumberOfBlocks>22</tns:NumberOfBlocks>
1177     <tns:BlockSize>1024</tns:BlockSize>
1178     <tns:Manufacturer>DrivesRUs</tns:Manufacturer>
1179     <tns:StorageCapability>
1180         <cap>NoSinglePointOfFailure>true</cap>NoSinglePointOfFailure>
1181         </tns:StorageCapability>
1182         <tns:StorageCapability>
1183             <cap>DataRedundancyMax>42</cap>DataRedundancyMax>
1184             </tns:StorageCapability>
1185     </GenericDiskDriveProperties>
```

1186 The following is a non-normative example of a SetResourceProperties request message using
1187 SOAP 1.2 [SOAP 1.2]:

```
1188 <s12:Envelope
1189     xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
1190     xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
1191     xmlns:wsrf-rp=
```

```
1192 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
1193 xmlns:ex="http://example.com/exampleNS">
1194 <s12:Header>
1195   <wsa:Action>
1196     http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
1197     06.wsdl/SetResourceProperties/SetResourcePropertiesRequest
1198   </wsa:Action>
1199   <wsa:To s12:mustUnderstand="1">
1200     http://www.provider.org/ProviderEndpoint
1201   </wsa:To>
1202   <ex:ResourceDisambiguator>
1203     uuid:84decd55-7d3f-65ad-ac44-675d9fce5d22
1204   </ex:ResourceDisambiguator>
1205 </s12:Header>
1206 <s12:Body>
1207   <wsrf-rp:SetResourceProperties
1208     xmlns:tns="http://example.com/diskdrive">
1209     <wsrf-rp:Update>
1210       <tns:NumberOfBlocks>143</tns:NumberOfBlocks>
1211     </wsrf-rp:Update>
1212
1213     <wsrf-rp:Delete ResourceProperty="tns:StorageCapability" />
1214
1215     <wsrf-rp:Insert>
1216       <tns:someElement>42</tns:someElement>
1217     </wsrf-rp:Insert>
1218
1219   </wsrf-rp:SetResourceProperties>
1220 </s12:Body>
1221 </s12:Envelope>
```

1222 The following is an example SetResourcePropertiesResponse message using SOAP 1.2 [SOAP
1223 1.2]:

```
1224 <s12:Envelope
1225   xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
1226   xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
1227   xmlns:wsrf-rp=
1228 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
1229   xmlns:resp="http://www.other.org/otherNS">
1230   <s12:Header>
1231     <wsa:Action>
1232     http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
1233     06.wsdl/SetResourceProperties/SetResourcePropertiesResponse
1234     </wsa:Action>
1235     <wsa:To s12:mustUnderstand="1">
1236       http://www.requestor.org/someEndpoint
1237     </wsa:To>
1238     <resp:SomeResourceRef>
1239       uuid:9fef5fec-6dc3-44a2-ba32-8680cace43f9
```

```
1240     </resp:SomeResourceRef>
1241     </s12:Header>
1242     <s12:Body>
1243         <wsrf-rp:SetResourcePropertiesResponse>
1244             </wsrf-rp:SetResourcePropertiesResponse>
1245         </s12:Body>
1246     </s12:Envelope>
1247 The new contents of the resource properties document after successful processing of the request
1248 message MUST be:
1249 <GenericDiskDriveProperties xmlns:tns="http://example.com/diskDrive" >
1250     <tns:NumberOfBlocks>143</tns:NumberOfBlocks>
1251     <tns:BlockSize>1024</tns:BlockSize>
1252     <tns:someElement>42</tns:someElement>
1253     <tns:Manufacturer>DrivesRUs</tns:Manufacturer>
1254 </GenericDiskDriveProperties>
```

5.7 InsertResourceProperties

A WS-Resource MAY support the message exchange defined in this section that allows a requestor to insert new values of a resource property of a WS-Resource.

The InsertResourceProperties message is used to request the insertion of one or more element values of a single resource property into the resource properties document of a WS-Resource.

The format of this request message MUST be:

```
<wsrf-rp:InsertResourceProperties>
    <wsrf-rp:Insert>
        {any}*
    </wsrf-rp:Insert>
</wsrf-rp:InsertResourceProperties>
```

The InsertResourceProperties request message MUST follow the WS-Resource Access Pattern. If a SOAPAction URI is included in the transport portion of the InsertResourceProperties message, it MUST contain the URI <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.wsdl/InsertResourceProperties/InsertResourcePropertiesRequest>.

The contents of the InsertResourceProperties request message are further described as follows:

/wsrf-rp:InsertResourceProperties/wsrf-rp:Insert

The intent of this component is to insert the contents of the component into the resource properties document. The exact placement of the element insertion is implementation-dependent. If, as a result of processing the InsertResourceProperty request, the resource properties document is no longer able to validate, the processing of the request MUST fault. The implementation may be unable to accept the insertion of an element because it does not allow the requestor to insert a resource property (or its value) of that given name. In such circumstances, the resource MUST fault the processing of the request message.

/wsrf-rp:InsertResourceProperties/wsrf-rp:Insert/{any}

This component identifies the element(s) to be inserted into the resource properties document. If there are multiple child elements of the wsrf-rp:Insert element, each MUST

1284 have the same namespace and name (i.e. the same QName). The QName MUST
1285 correspond to the QName of a resource property element associated with the WS-
1286 Resource (i.e. an element that is a valid child element of the root element of the resource
1287 properties document). Note, for those resource properties documents that allow open
1288 element content, the set of valid content types can be very large.

1289 When an InsertResourceProperties request message has been successfully processed, the
1290 response message, MUST have the following form:

```
<wsrf-rp:InsertResourcePropertiesResponse>
```

1293 If a SOAPAction URI is included in the transport portion of the
1294 InsertResourcePropertiesResponse message, it MUST contain the URI <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.wsdl/InsertResourceProperties/InsertResourcePropertiesResponse>. If the WS-Resource does
1295 not respond to the InsertResourceProperties request message with the
1296 InsertResourcePropertiesResponse message, then it SHOULD send one of the following fault
1297 messages:

1300 ResourceUnknownFault:

- The resource identified in the message (which follows the WS-Resource Access Pattern) is not known to the Web service. This fault is specified by the WS-Resource [WS-Resource] specification.

1304 InvalidInsertResourcePropertiesRequestContent:

- The contents of the InsertResourceProperties request cause the resource properties document to no longer validate.

1307 UnableToModifyResourceProperty:

- A resource property identified by the InsertResourceProperties request is not modifiable.

1309 InvalidResourcePropertyQName:

- A resource property QName does not identify a resource property.

1311 InsertResourcePropertyRequestFailed:

- The InsertResourceProperty request failed for some reason.

1313 Note: All faults generated must be compliant with the WS-BaseFaults [WS-BaseFaults] specification.

1315 Any fault message indicating a failure during the update of the resource properties document
1316 MUST also indicate whether the document was restored by using the
1317 ResourcePropertyChangeFailure element of the fault. This fault element indicates the resource
1318 property element change associated with the fault and indicates if the resource property
1319 document as a whole was restored. The format of this element is described in Section 5.6.

1320 **5.7.1 Example SOAP Encoding of the InsertResourceProperties 1321 Message Exchange**

1322 Consider the following resource properties document defining resource properties for a WS-
1323 Resource defined by the GenericDiskDrive portType:

```
<GenericDiskDriveProperties xmlns:tns="http://example.com/diskDrive" >  
  
<tns:BlockSize>1024</tns:BlockSize>
```

```
1327 <tns:Manufacturer>DrivesRUs</tns:Manufacturer>
1328 </GenericDiskDriveProperties>
```

1329 The following is a non-normative example of an InsertResourceProperties request message using
1330 SOAP 1.2 [SOAP 1.2]:

```
1331 <s12:Envelope
1332     s12="http://www.w3.org/2003/05/soap-envelope"
1333     xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
1334     xmlns:wsrf-rp=
1335     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
1336     xmlns:ex="http://example.com/exampleNS">
1337     <s12:Header>
1338         <wsa:Action>
1339             http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
1340             06.wsdl/InsertResourceProperties/InsertResourcePropertiesRequest
1341         </wsa:Action>
1342         <wsa:To s12:mustUnderstand="1">
1343             http://www.provider.org/ProviderEndpoint
1344         </wsa:To>
1345         <ex:ResourceDisambiguator>
1346             uuid:84decd55-7d3f-65ad-ac44-675d9fce5d22
1347         </ex:ResourceDisambiguator>
1348     </s12:Header>
1349     <s12:Body>
1350         <wsrf-rp:InsertResourceProperties
1351             xmlns:tns="http://example.com/diskdrive">
1352             <wsrf-rp:Insert>
1353                 <tns:StorageCapability>
1354                     <tns>NoSinglePointOfFailure>true</tns>NoSinglePointOfFailure>
1355                 </tns:StorageCapability>
1356                 <tns:StorageCapability>
1357                     <tns>DataRedundancyMax>42</tns>DataRedundancyMax>
1358                 </tns:StorageCapability>
1359             </wsrf-rp:Insert>
1360
1361             </wsrf-rp:InsertResourceProperties>
1362         </s12:Body>
1363     </s12:Envelope>
```

1364 The following is an example InsertResourcePropertiesResponse message using SOAP 1.2
1365 [SOAP 1.2]:

```
1366 <s12:Envelope
1367     s12="http://www.w3.org/2003/05/soap-envelope"
1368     xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
1369     xmlns:wsrf-rp=
1370     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
1371     xmlns:resp="http://www.other.org/otherNS">
1372     <s12:Header>
1373         <wsa:Action>
```

```

1374 http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
1375 06.wsdl/InsertResourceProperties/InsertResourcePropertiesResponse
1376     </wsa:Action>
1377     <wsa:To s12:mustUnderstand="1">
1378         http://www.requestor.org/someEndpoint
1379     </wsa:To>
1380     <resp:SomeResourceRef>
1381         uuid:9fef5fec-6dc3-44a2-ba32-8680cace43f9
1382     </resp:SomeResourceRef>
1383     </s12:Header>
1384     <s12:Body>
1385         <wsrf-rp:InsertResourcePropertiesResponse>
1386             </wsrf-rp:InsertResourcePropertiesResponse>
1387         </s12:Body>
1388     </s12:Envelope>

```

1389 The new contents of the resource properties document after successful processing of the request
1390 message MUST be:

```

1391 <GenericDiskDriveProperties xmlns:tns="http://example.com/diskDrive" >
1392     locks>22</tns:NumberOfBlocks>
1393     <tns:BlockSize>1024</tns:BlockSize>
1394     <tns:Manufacturer>DrivesRUs</tns:Manufacturer>
1395     <tns:StorageCapability>
1396         <tns:NoSinglePointOfFailure>true</tns:NoSinglePointOfFailure>
1397     </tns:StorageCapability>
1398     <tns:StorageCapability>
1399         <tns:DataRedundancyMax>42</tns:DataRedundancyMax>
1400     </tns:StorageCapability>
1401 </GenericDiskDriveProperties>

```

1402 **5.8 UpdateResourceProperties**

1403 A WS-Resource MAY support the message exchange defined in this section that allows a
1404 requestor to replace the existing values of a resource property with new values.

1405 The UpdateResourceProperties message is used to request the replacement of all the element
1406 values of a single resource property in the resource properties document of a WS-Resource with
1407 a new set of values.

1408 The format of this request message MUST be:

```

1409 <wsrf-rp:UpdateResourceProperties>
1410
1411     {any}*
1412     </wsrf-rp:Update>
1413 </wsrf-rp:UpdateResourceProperties>

```

1414 The UpdateResourceProperties request message MUST follow the WS-Resource Access
1415 Pattern. If a SOAPAction URI is included in the transport portion of the
1416 UpdateResourceProperties message, it MUST contain the URI <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.wsdl/UpdateResourceProperties/UpdateResourcePropertiesRequest>.

1419 The contents of the UpdateResourceProperties request message are further described as
1420 follows:

1421 /wsrf-rp:UpdateResourceProperties/wsrf-rp:Update

1422 The intent of this request is to change the value of the elements of a resource property by
1423 removing any and all resource property element(s) of the given QName and replacing
1424 them with the contents of this component. If, as a result of processing the entire
1425 UpdateResourceProperty request, the resource properties document is no longer able to
1426 validate, the processing of the request MUST fault. The resource may be unable to
1427 accept the update of an element because it does not allow the requestor to update a
1428 resource property (or its value) of that given name. In such circumstances, the resource
1429 MUST fault the processing of the request message.

1430 /wsrf-rp:UpdateResourceProperties/wsrf-rp:Update/{any}

1431 This identifies the element(s) to be inserted into the resource properties document,
1432 replacing all element children of the root of the resource properties document with the
1433 same QName. If there are multiple child elements of the wsrf-rp:Update component, each
1434 MUST have the same namespace and name (i.e. the same QName). The QName MUST
1435 correspond to the QName of a resource property element associated with the WS-
1436 Resource (i.e. an element that is a valid child element of the root element of the resource
1437 properties document). Note, for those resource properties documents that allow open
1438 element content, the set of valid content types can be very large.

1439 When an UpdateResourceProperties request message has been successfully processed, the
1440 response message MUST have the following form:

1441 <wsrf-rp:UpdateResourcePropertiesResponse>

1443 If a SOAPAction URI is included in the transport portion of the SetResourceProperties message,
1444 it MUST contain the URI <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.wsdl>/UpdateResourceProperties/UpdateResourcePropertiesResponse. If the WS-
1446 Resource does not respond to the UpdateResourceProperties request message with the
1447 UpdateResourcePropertiesResponse message, then it SHOULD send one of the following fault
1448 messages:

1449 ResourceUnknownFault:

1450 • The resource identified in the message (which follows the WS-Resource Access Pattern)
1451 is not known to the Web service. This fault is specified by the WS-Resource [WS-
1452 Resource] specification.

1453 InvalidUpdateResourcePropertiesRequestContent:

1454 • The contents of the UpdateResourceProperties request cause the resource properties
1455 document to no longer validate.

1456 UnableToModifyResourceProperty:

1457 • A resource property identified by the UpdateResourceProperties request is not
1458 modifiable.

1459 InvalidResourcePropertyQName:

1460 • A resource property QName does not identify a resource property.

1461 UpdateResourcePropertiesRequestFailed:

1462 • The UpdateResourceProperties request failed for some reason.

1463 Note: All faults generated must be compliant with the WS-BaseFaults [WS-BaseFaults]
1464 specification.
1465 Any fault message indicating a failure during the update of the resource properties document
1466 MUST also indicate whether the document was restored by using the
1467 ResourcePropertyChangeFailure element of the fault. This fault element indicates the resource
1468 property element change associated with the fault and indicates if the resource property
1469 document as a whole was restored. The format of this element is described in Section 5.6.

1470 **5.8.1 Example SOAP Encoding of the UpdateResourceProperties 1471 Message Exchange**

1472 Consider the following resource properties document defining resource properties for a WS-
1473 Resource defined by the GenericDiskDrive portType:

```
1474 <GenericDiskDriveProperties xmlns:tns="http://example.com/diskDrive" >  
1475  
1476     <tns:BlockSize>1024</tns:BlockSize>  
1477     <tns:Manufacturer>DrivesRUs</tns:Manufacturer>  
1478 </GenericDiskDriveProperties>
```

1479 The following is a non-normative example of a UpdateResourceProperties request message
1480 using SOAP 1.2 [SOAP 1.2]:

```
1481 <s12:Envelope  
1482         xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"  
1483         xmlns:wsrf-rp=  
1484             "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"  
1485         xmlns:ex="http://example.com/exampleNS">  
1486         <s12:Header>  
1487             <wsa:Action>  
1488                 http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-  
1489                 06.wsdl/UpdateResourceProperties/UpdateResourcePropertiesRequest  
1490             </wsa:Action>  
1491             <wsa:To s12:mustUnderstand="1">  
1492                 http://www.provider.org/ProviderEndpoint  
1493             </wsa:To>  
1494             <ex:ResourceDisambiguator>  
1495                 uuid:84decd55-7d3f-65ad-ac44-675d9fce5d22  
1496             </ex:ResourceDisambiguator>  
1497         </s12:Header>  
1498         <s12:Body>  
1499             <wsrf-rp:UpdateResourceProperties  
1500                 xmlns:tns="http://example.com/diskdrive">  
1501                 <wsrf-rp:Update>  
1502                     <tns:NumberOfBlocks>143</tns:NumberOfBlocks>  
1503                     </wsrf-rp:Update>  
1504                 </wsrf-rp:UpdateResourceProperties>  
1505             </s12:Body>  
1506         </s12:Envelope>
```

1508 The following is an example UpdateResourcePropertiesResponse message using SOAP 1.2
1509 [SOAP 1.2]:

```
1510 <s12:Envelope  
1511   xmlns:s12="http://www.w3.org/2003/05/soap-envelope"  
1512   xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"  
1513   xmlns:wsrf-rp=  
1514     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"  
1515   xmlns:resp="http://www.other.org/otherNS">  
1516   <s12:Header>  
1517     <wsa:Action>  
1518       http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-  
1519       06.wsdl/UpdateResourceProperties/UpdateResourcePropertiesResponse  
1520     </wsa:Action>  
1521     <wsa:To s12:mustUnderstand="1">  
1522       http://www.requestor.org/someEndpoint  
1523     </wsa:To>  
1524     <resp:SomeResourceRef>  
1525       uuid:9fef5fec-6dc3-44a2-ba32-8680cace43f9  
1526     </resp:SomeResourceRef>  
1527   </s12:Header>  
1528   <s12:Body>  
1529     <wsrf-rp:UpdateResourcePropertiesResponse>  
1530     </wsrf-rp:UpdateResourcePropertiesResponse>  
1531   </s12:Body>  
1532 </s12:Envelope>
```

1533 The new contents of the resource properties document after successful processing of the request
1534 message MUST be:

```
1535 <GenericDiskDriveProperties xmlns:tns="http://example.com/diskDrive" >  
1536   <tns:NumberOfBlocks>143</tns:NumberOfBlocks>  
1537   <tns:BlockSize>1024</tns:BlockSize>  
1538   <tns:Manufacturer>DrivesRUs</tns:Manufacturer>  
1539 </GenericDiskDriveProperties>
```

1540 **5.9 DeleteResourceProperties**

1541 A WS-Resource MAY support the message exchange defined in this section that allows a
1542 requestor to remove all values of a resource property of a WS-Resource.

1543 The DeleteResourceProperties message is used to request the removal of all values of a single
1544 resource property from the resource properties document of a WS-Resource.

1545 The format of this request message MUST be:

```
1546 <wsrf-rp:DeleteResourceProperties>  
1547   <wsrf-rp:Delete ResourceProperty="QName" />  
1548 </wsrf-rp:DeleteResourceProperties>
```

1549 The DeleteResourceProperties request message MUST follow the WS-Resource Access Pattern.
1550 If a SOAPAction URI is included in the transport portion of the DeleteResourceProperties
1551 message, it MUST contain the URI <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS->

1552 ResourceProperties-1.2-draft-
1553 06.wsdl/DeleteResourceProperties/DeleteResourcePropertiesRequest.
1554 The contents of the DeleteResourceProperties request message are further described as follows:
1555 /wsrf-rp:DeleteResourceProperties/wsrf-rp:Delete
1556 The intent of this message is to remove all element children of the root of the resource
1557 properties document whose QNames correspond to the value of @ResourceProperty. If
1558 the resource is unable to remove all identified elements, the processing of the message
1559 MUST fault. If, as a result of processing the DeleteResourceProperty request, the resource
1560 properties document is no longer able to validate, the processing of the request MUST
1561 fault. The resource may be unable to accept the deletion of an element because it does
1562 not allow the requestor to delete a resource property (or its value) of the given name. In
1563 such circumstances, the resource MUST fault the processing of the request message.
1564 /wsrf-rp:DeleteResourceProperties/wsrf-rp:Delete/@ResourceProperty
1565 This attribute contains the QName of a resource property to be deleted by this request.
1566 When a DeleteResourceProperties request message has been successfully processed, the
1567 response message MUST have the following form:
1568 <wsrf-rp:DeleteResourcePropertiesResponse>
1569 </wsrf-rp:DeleteResourcePropertiesResponse>
1570 If a SOAPAction URI is included in the transport portion of the UpdateResourceProperties
1571 message, it MUST contain the URI http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
1572 ResourceProperties-1.2-draft-
1573 06.wsdl/DeleteResourceProperties/DeleteResourcePropertiesResponse.
1574 If the WS-Resource does not respond to the DeleteResourceProperties request message with the
1575 DeleteResourcePropertiesResponse message, then it SHOULD send one of the following fault
1576 messages:
1577 ResourceUnknownFault:
1578 • The resource identified in the message (which follows the WS-Resource Access Pattern)
1579 is not known to the Web service. This fault is specified by the WS-Resource [WS-
1580 Resource] specification.
1581 UnableToModifyResourceProperty:
1582 • A resource property identified by the DeleteResourceProperties request is not modifiable.
1583 InvalidResourcePropertyQName:
1584 • A resource property QName does not identify a resource property.
1585 DeleteResourcePropertiesRequestFailed:
1586 • One or more components of the DeleteResourceProperties request failed.
1587 Note: All faults generated must be compliant with the WS-BaseFaults [WS-BaseFaults]
1588 specification.
1589 Any fault message indicating a failure during the update of the resource properties document
1590 MUST also indicate whether the document was restored by using the
1591 ResourcePropertyChangeFailure element of the fault. This fault element indicates the resource
1592 property element change associated with the fault and indicates if the resource property
1593 document as a whole was restored. The format of this element is described in Section 5.6.

1594 **5.9.1 Example SOAP Encoding of the DeleteResourceProperties**
1595 **Message Exchange**

1596 Consider the following resource properties document defining resource properties for a WS-
1597 Resource defined by the GenericDiskDrive portType:

```
1598 <GenericDiskDriveProperties xmlns:tns="http://example.com/diskDrive" >  
1599   <tns:NumberOfBlocks>22</tns:NumberOfBlocks>  
1600   <tns:BlockSize>1024</tns:BlockSize>  
1601   <tns:Manufacturer>DrivesRUs</tns:Manufacturer>  
1602 </GenericDiskDriveProperties>
```

1603 The following is a non-normative example of a DeleteResourceProperties request message using
1604 SOAP 1.2 [SOAP 1.2]:

```
1605 <s12:Envelope  
1606   xmlns:s12="http://www.w3.org/2003/05/soap-envelope"  
1607   xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"  
1608   xmlns:wsrf-rp=  
1609     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"  
1610   xmlns:ex="http://example.com/exampleNS">  
1611   <s12:Header>  
1612     <wsa:Action>  
1613       http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-  
1614       06.wsdl/DeleteResourceProperties/DeleteResourcePropertiesRequest  
1615     </wsa:Action>  
1616     <wsa:To s12:mustUnderstand="1">  
1617       http://www.provider.org/ProviderEndpoint  
1618     </wsa:To>  
1619     <ex:ResourceDisambiguator>  
1620       uuid:84decd55-7d3f-65ad-ac44-675d9fce5d22  
1621     </ex:ResourceDisambiguator>  
1622   </s12:Header>  
1623   <s12:Body>  
1624     <wsrf-rp:DeleteResourceProperties  
1625       xmlns:tns="http://example.com/diskdrive">  
1626       <wsrf-rp:Delete ResourceProperty="tns:Manufacturer" />  
1627     </wsrf-rp:DeleteResourceProperties>  
1628   </s12:Body>  
1629 </s12:Envelope>
```

1630 The following is an example DeleteResourcePropertiesResponse message using SOAP 1.2
1631 [SOAP 1.2]:

```
1632 <s12:Envelope  
1633   xmlns:s12="http://www.w3.org/2003/05/soap-envelope"  
1634   xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"  
1635   xmlns:wsrf-rp=  
1636     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"  
1637     xmlns:resp="http://www.other.org/otherNS">  
1638   <s12:Header>
```

```
1639 <wsa:Action>
1640 http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-
1641 06.wsdl/DeleteResourceProperties/DeleteResourcePropertiesResponse
1642 </wsa:Action>
1643 <wsa:To s12:mustUnderstand="1">
1644 http://www.requestor.org/someEndpoint
1645 </wsa:To>
1646 <resp:SomeResourceRef>
1647 uuid:9fef5fec-6dc3-44a2-ba32-8680cace43f9
1648 </resp:SomeResourceRef>
1649 </s12:Header>
1650 <s12:Body>
1651 <wsrf-rp:DeleteResourcePropertiesResponse>
1652 </wsrf-rp:DeleteResourcePropertiesResponse>
1653 </s12:Body>
1654 </s12:Envelope>
```

1655 The new contents of the resource properties document after successful processing of the request
1656 message MUST be:

```
1657 <GenericDiskDriveProperties xmlns:tns="http://example.com/diskDrive" >
1658 <tns:NumberOfBlocks>22</tns:NumberOfBlocks>
1659 <tns:BlockSize>1024</tns:BlockSize>
1660 </GenericDiskDriveProperties>
```

1661 6 Subscription

1662 The WS-Notification [WS-Notification] family of specifications describes the patterns, concepts,
1663 standard message exchanges, and protocols of a topic-based, publish-subscribe messaging
1664 pattern in Web services. In the notification model, a service creates messages that are delivered
1665 to other services that had previously registered interest in the situation associated with that
1666 message.

1667 With WS-ResourceProperties, it is a common pattern for Web service requestors to request
1668 notification of inserts, updates and deletions made to the values of one or more resource property
1669 elements of a given WS-Resource. This suggests the need for the WS-Resource to
1670 encapsulate the stateful resource to ensure all changes made to the stateful resource (those
1671 made by Web services invocations, or those that happen to the resource by other means) are
1672 observed by the WS-Resource implementation. To the extent that encapsulation is not provided,
1673 and changes to the stateful resource are made outside of the knowledge of the associated WS-
1674 Resource implementation, the WS-Resource may not be able to provide notifications reflecting
1675 those changes.

1676 If a WS-Resource supports the resource property value-change notification pattern, and if it uses
1677 WS-Notification to implement this feature, then it MUST implement the message exchanges for
1678 the NotificationProducer role, as specified in [WS-BaseNotification]. The WS-Resource MAY
1679 accept subscriptions to only a subset of the resource properties defined for a WS-Resource. If an
1680 implementation does not use WS-Notification, then it MAY ignore the requirements outlined in this
1681 section.

1682 6.1 Individual Resource Property Value Changes

1683 One notification message artifact is created for each change to each resource property observed
1684 by the WS-Resource implementation. For example, a SetResourceProperties request message
1685 may contain five SetRequestComponents. Each of these components would result in the creation
1686 of a separate message artifact. A PutResourcePropertyDocument request may result in the
1687 change of most of the WS-Resource's resource properties, in which case each resource property
1688 changed by the PutResourcePropertyDocument request would result in a separate message
1689 artifact.

1690 WS-ResourceProperties defines the Notification Topic and TopicSpace elements [WS-Topics]
1691 that MUST be used to express the organization of the WS-Resource property element value
1692 change notifications. By understanding the relationship between Topics and resource properties,
1693 and examining the set of Topics supported by the NotificationProducer Web service, the service
1694 requestor can determine which of the resource properties are able to participate in the value-
1695 change notification pattern. The Topic and TopicSpace elements associated with resource
1696 property value-change notification are described as follows:

1697 1. The WS-Resource's resource properties document MAY be defined using resource
1698 properties declared in multiple XML namespaces. For each of these XML namespaces, an
1699 associated TopicSpace element MUST be defined. The TopicSpace element defines a topic
1700 space intended to contain topics related to value changes of resource properties declared in
1701 that XML namespace.

- 1702 ○ The value of the TopicSpace element's targetNamespace attribute MUST be the
1703 same as the URI of the namespace in which the resource property element is
1704 defined. The name attribute of the TopicSpace element SHOULD have the value
1705 "ResourcePropertiesTopicSpace".

- 1706 2. For each resource property participating in the value-change notification pattern, a Topic
 1707 element MUST be defined as a child of the TopicSpace element defined in 1.
- 1708 o Notification messages reflecting changes to the resource property are associated
 1709 with this Topic.
- 1710 o The value of the Topic element's name attribute MUST be the same as the NCName
 1711 of the resource property element.
- 1712 o The value of the Topic element's messageTypes attribute MUST include wsrf-
 1713 rp:ResourcePropertyValueChangeNotification (defined later in this section). In
 1714 addition, it MAY include QNames of other message elements.
- 1715 o A designer MAY introduce additional child sub-topic elements to the topic element
 1716 that represent application-specific needs.
- 1717 3. The WS-Resource acting as the NotificationProducer MUST include Topics defined in 2, as
 1718 part of the value of its "Topics" resource property element. One such Topic MUST be
 1719 included for each resource property element offered as a target for a value-change
 1720 subscription.
- 1721 4. When a WS-Resource observes a resource property value change, it SHOULD create a
 1722 notification message that expresses the situation, and associate the notification message
 1723 with the Topic associated with that resource property. Note: there are many circumstances in
 1724 which a change to a resource property might not result in the generation of a notification
 1725 message. For example, a resource property value may change frequently, making generation
 1726 of notification messages too expensive for the service. In this situation, a WS-Resource may
 1727 choose to never generate notification message artifacts to record value change, or it may
 1728 choose to generate notification message artifacts for a subset of the value change situations.

1729 The wsrf-rp:ResourcePropertyValueChangeNotification element MUST appear as a component
 1730 of the notification message associated with resource property value change topics. This element
 1731 is defined as follows:

```
<wsrf-rp:ResourcePropertyValueChangeNotification>
  <wsrf-rp:OldValues> xsd:any *</wsrf-rp:OldValues>?
  <wsrf-rp>NewValues> xsd:any *</wsrf-rp>NewValues>
</wsrf-rp:ResourcePropertyValueChangeNotification>
```

1736 This element may appear as the root element of the notification message, or it may appear as a
 1737 descendent of the root, accommodating patterns where the notification message itself is
 1738 contained in an enveloping mechanism. The form of the
 1739 ResourcePropertyValueChangeNotification is further constrained as follows:

1740 /wsrf-rp:ResourcePropertyValueChangeNotification

1741 One ResourcePropertyValueChangeNotification element is created for each resource
 1742 property value change situation detected and acted upon by the WS-Resource. This
 1743 component records the value change of the affected resource property.

1744 /wsrf-rp:ResourcePropertyValueChangeNotification/OldValues

1745 This element, if it appears, MUST contain the resource property elements of the affected
 1746 WS-Resource property immediately prior to when the value change was applied. If the
 1747 resource property did not have any value prior to the value change (for example, this
 1748 notification represents an insertion of a new resource property element) then this element
 1749 is empty and will contain the attribute xsi:nil with value "true". If this component does not
 1750 appear in the message, then the WS-Resource was unable or unwilling to record the
 1751 resource property elements prior to the value change.

1752 /wsrf-rp:ResourcePropertyValueChangeNotification/NewValues
1753 This element MUST contain the resource property elements of the affected WS-Resource
1754 property after the value change condition was detected. If the WS-Resource property
1755 does not have any value after the value change (for example, this notification represents
1756 a deletion of the resource property element) then this element is empty and will contain
1757 the attribute xsi:nil with value “true”.

1758 **6.2 Value Changes on Any Resource Property**

1759 In addition to the Topics defined for value change notification to individual resource properties
1760 (described in the previous section), the WS-Resource MAY also support subscription for changes
1761 to *any* resource property. This specification defines a distinguished topic, named
1762 “AnyResourcePropertyValueChange” in a distinguished TopicSpace corresponding to the WS-
1763 ResourceProperties specification namespace.

1764 If the WS-Resource supports the NotificationProducer interface (as defined by WS-
1765 BaseNotification) and it supports subscriptions on the wsrf-rp:AnyResourcePropertyValueChange
1766 topic, then it MUST include this Topic’s QName in the value of its wsnt:Topics resource property.
1767 Furthermore, for any ResourcePropertyValueChange notification message published on any
1768 Topic, the WS-Resource MUST also publish the notification message on the wsrf-
1769 rp:AnyResourcePropertyValueChange Topic.

1770 7 ACID Properties of Operations on WS- 1771 Resources

1772 The ability to associate a transactional recovery policy to the execution of a Web service
1773 message exchange is a quality of service the designer would compose into the definition of a
1774 WS-Resource. Example specifications of such behavior include the Web Services Atomic
1775 Transaction specification [WS-AtomicTransaction] or the work of the OASIS WS-Composite
1776 Application Framework TC [WS-CAF]. In the presence of a transactional unit of work, a Web
1777 service capable of participating in the transactional protocol must abide by the rules of two-phase-
1778 commit transaction management. However, in the absence of a transaction management policy,
1779 the Web service is under no obligation to recover the state of the WS-Resource in the event of a
1780 failure during message processing.

1781 This specification is not prescriptive with respect to policy that governs concurrent read or write
1782 access to a WS-Resource. The definition of specific policy governing concurrent updates,
1783 whether or not separate message executions targeting the same WS-Resource may be
1784 interleaved, and whether partially-completed WS-Resource updates within a given message
1785 execution may be observed by other concurrent requests is beyond the scope of this definition.
1786 The scope and extent of the isolation of changes made to the WS-Resource is an implementation
1787 dependent responsibility of the WS-Resource itself. The WS-Resource must also take on the
1788 responsibility for the scope and extent to which notifications of changes to the WS-Resource are
1789 isolated and made observable. If WS-Resource update isolation is needed, we suggest the use of
1790 a transaction to provide a context within which isolation of WS-Resource updates can be
1791 provided. In the absence of a transactional unit of work, the level of WS-Resource update
1792 atomicity, recovery, isolation, and durability provided is implementation-dependent.

1793 The ability to declare and attach isolation-level policy to the definition of a Web service message
1794 exchange, whether or not a transactional unit of work is present, represents a general
1795 requirement not met by the current Web service architecture. In the future, isolation-level policy
1796 declarations may be introduced as a formal part of the WS-Resource definition. Refer to [State
1797 Paper] for a general discussion of these requirements.

1798 8 Security Considerations

1799 This specification defines the resource properties document and also the set of message
1800 exchanges that MUST be supported by a WS-Resource. In this context, there are two categories
1801 of security aspects that need to be considered: (a) securing the message exchanges and (b)
1802 securing the resource properties.

1803 8.1 Securing the message exchanges

1804 When messages are exchanged between a requestor and a WS-Resource in order to access or
1805 act on one or more resource properties, it is RECOMMENDED that the communication between
1806 services be secured using the mechanisms described in WS-Security. In order to properly secure
1807 messages, the message body and all relevant headers need to be included in the digital
1808 signature so as to prove the integrity of the message. In addition the ReferenceProperties from an
1809 EndpointReference, used as part of any message exchange, may be encrypted to ensure their
1810 privacy. In the event that a requestor communicates frequently with a Web service to access
1811 resource properties, either directly through a query or accomplished through notification of state
1812 change, it is RECOMMENDED that a security context be established using the mechanisms
1813 described in WS-Trust [WS-Trust] and WS-SecureConversation [WS-SecureConversation],
1814 allowing for potentially more efficient means of authentication.

1815 It is common for communication between requestors and the WS-Resource to exchange multiple
1816 messages. As a result, the usage profile may be susceptible to key attacks. For this reason it is
1817 RECOMMENDED that the keys used to secure the channel be changed frequently. This "re-
1818 keying" can be effected a number of ways. The following list outlines four common techniques:

- 1819 • Attaching a nonce to each message and using it in a derived key function with the shared
1820 secret
- 1821 • Using a derived key sequence and switch "generations"
- 1822 • Closing and re-establishing a security context
- 1823 • Exchanging new secrets between the parties

1824 It should be noted that the mechanisms listed above are independent of the security context
1825 token (SCT). That is, the keys used to secure the channel during message exchanges may be
1826 independent of the key used to prove the right to access WS-ResourceProperties.

1827 The security context MAY be re-established using the mechanisms described in WS-Trust and
1828 WS-SecureConversation. Similarly, secrets can be exchanged using the mechanisms described
1829 in WS-Trust. Note, however, that the current shared secret SHOULD NOT be used to encrypt the
1830 new shared secret. Derived keys, the preferred solution from this list, can be specified using the
1831 mechanisms described in WS-SecureConversation.

1832 The following list summarizes common classes of attacks that apply to this protocol and identifies
1833 the mechanism to prevent/mitigate the attacks:

- 1834 • **Message alteration** – Alteration is prevented by including signatures of the message
1835 information using WS-Security.
- 1836 • **Message disclosure** – Confidentiality is preserved by encrypting sensitive data using WS-
1837 Security.
- 1838 • **Key integrity** – Key integrity is maintained by using the strongest algorithms possible (by
1839 comparing secured policies – see WS-Policy [WS-Policy] and WS-SecurityPolicy [WS-
1840 SecurityPolicy]).

- **Authentication** – Authentication is established using the mechanisms described in WS-Security and WS-Trust. Each message is authenticated using the mechanisms described in WS-Security.
- **Accountability** – Accountability is a function of the type of and string of the key and algorithms being used. In many cases, a strong symmetric key provides sufficient accountability. However, in some environments, strong PKI signatures are required.
- **Availability** – Many services are subject to a variety of availability attacks. Replay is a common attack and it is RECOMMENDED that this be addressed as described in the Replay bullet item below. Other attacks, such as network-level denial of service attacks, are harder to avoid and are outside the scope of this specification. That said, care should be taken to ensure that minimal processing be performed prior to any authenticating sequences.
- **Replay** – Messages may be replayed for a variety of reasons. To detect and eliminate this attack, mechanisms should be used to identify replayed messages such as the timestamp/nonce outlined in WS-Security and the sequences outlined in WS-ReliableMessaging [WS-ReliableMessaging].

8.2 Securing Resource Properties

Since WS-ResourceProperties defines a mechanism to expose properties of a WS-Resource, security policies should be established that ensure that only authorized requestors can access the value of a resource property. In order to secure access to the resource properties, the message exchanges that provide the access should be appropriately controlled. Authorization policies should be put in place so that the implications of providing the state information (through GetResourceProperty, GetMultipleResourceProperties, or QueryResourceProperties messages or through notification of value change and modification of the resource properties), are taken into account. These policies should also take into account the semantic difference between components of the SetResourceProperties message – i.e. that an Update component updates a *value* of a resource property, whereas Insert and Delete components modify whether the WS-Resource actually *contains* the resource property values.

The authorization policies may also reflect the sensitivity of the resource property(ies) that are accessible from a WS-Resource. Policies can be set at the coarse granularity of the message exchange (e.g., Get(Multiple)ResourceProperty(ies) vs SetResourceProperty), but finer-grained control at the level of individual resource properties may be desired in some scenarios (e.g. user Bob can access value of “Manufacturer” but not “NumberOfBlocks”).

Given that a requestor will be able to access a resource property value by subscribing to state changes, care should be taken to set up security policies so that a consistent policy is in effect irrespective of whether the resource property value is accessed through direct message exchanges (e.g., GetResourceProperty) or indirectly through subscription for state changes (i.e., subscription to “ResourceChangePropertyValueNotification” topic). It should also be noted that a requestor will be able to query the value of a property through the QueryResourceProperty operation, or by using a domain-specific operation corresponding to a resource property (e.g., getNumberOfBlocks) if one exists. Therefore, the authorization policy on QueryResourceProperty operation (and the getXXX operation, if one is declared on the Web service for resource property named XXX) should be set so that a requestor who is not authorized to get a value of a resource property through a GetResourceProperty request is not able to deduce the value indirectly through the QueryResourceProperty request (or the getXXX operation on the Web service).

Even if the requestor is authorized to access the requested resource properties, it is RECOMMENDED that the resource properties that are exchanged between a requestor and a Web service are secured to ensure integrity and/or confidentiality of the resource property values.

- 1888 This will prevent unauthorized alteration of and/or access to the property values while in transit.
1889 This would mean that the specific resource property elements are signed and/or encrypted within
1890 the message by leveraging WS-Security as discussed in the previous section.

1891 9 References

1892 9.1 Normative

1893	[RFC2119]	S. Bradner, <i>Key words for use in RFCs to Indicate Requirement Levels</i> , http://www.ietf.org/rfc/rfc2119.txt , IETF RFC 2119, March 1997.
1894	[URI]	T. Berners-Lee, R. Fielding, L. Masinter, "Uniform Resource Identifiers (URI): Generic Syntax," RFC 2396, MIT/LCS, U.C. Irvine, Xerox Corporation, August 1998.
1895	[WS-Addressing]	http://www.w3.org/Submission/2004/SUBM-ws-addressing-20040810
1896	[WS-BaseNotification]	http://docs.oasis-open.org/wsn/2004/06/wsn-WS-BaseNotification-1.2-draft-04.pdf
1897	[WS-Notification]	http://www.oasis-open.org/committees/download.php/6661/WSNpubsub-1-0.pdf
1898	[WS-Resource]	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-Resource-1.2-draft-02.pdf
1899	[WS-ResourceLifetime]	http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft-04.pdf
1900	[WS-Topics]	http://docs.oasis-open.org/wsn/2004/06/wsn-WS-Topics-1.2-draft-01.pdf
1901	[XML-InfoSet]	http://www.w3.org/TR/xml-infoset/
1902	[XPATH]	http://www.w3.org/TR/xpath/

1914 9.2 Non-Normative

1915	[OGSI 1.0]	Open Grid Services Infrastructure (OGSI) V1.0 http://forge.gridforum.org/projects/ggf-editor/document/draft-ogsi-service-1/en/1
1916	[State Paper]	http://www.oasis-open.org/committees/download.php/6795/ws-modelingresources.pdf
1917	[WS-AtomicTransaction]	http://www.ibm.com/developerworks/webservices/library/ws-atomtran/
1918	[WS-Policy]	http://www-106.ibm.com/developerworks/library/specification/ws-polfram/
1919	[WS-CAF]	http://www.oasis-open.org/apps/org/workgroup/ws-caf/
1920	[WS-ReliableMessaging]	http://www.ibm.com/developerworks/webservices/library/ws-rm/
1921	[WS-SecureConversation]	http://www-106.ibm.com/developerworks/library/specification/ws-secon/
1922	[WS-Security]	http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-soap-message-security-1.0.pdf
1923	[WS-SecurityPolicy]	http://www-106.ibm.com/developerworks/webservices/library/ws-secpol/

1932	[WS-Trust]	http://www-106.ibm.com/developerworks/webservices/library/specification/ws-trust/
1933		
1934		
1935	[WSDL 2.0]	http://www.w3.org/TR/wsdl12/

1936 Appendix A. Acknowledgments

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1942

1943 Akhil Arora (Sun Microsystems), Tim Banks (IBM), Jeff Bohren (OpenNetwork), Conor Cahill
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1945 Thomas Freund (IBM), Stephen Graham (IBM), Anish Karmarkar (Oracle), Hideharu Kato
1946 (Hitachi), David Levine (IBM), Paul Lipton (Computer Associates), Mark Little (Arjuna
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1963 (IBM).

1964 Appendix B. XML Schema

1965 The XML types and elements used in this specification are included here for convenience. The
1966 authoritative version of this schema document is available at

1967 <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd>

1968 <?xml version="1.0" encoding="UTF-8"?>

1969 <!--

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2005
2006 -->

2007 <xsd:schema
2008 xmlns:xsd="http://www.w3.org/2001/XMLSchema"
2009 xmlns:wsrf-rp=

```

2010      "http://docs.oasis-open.org/wsrf/200503/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
2011      xmlns:wsrf-bf=
2012      "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-BaseFaults-1.2-draft-04.xsd"
2013      elementFormDefault="qualified" attributeFormDefault="unqualified"
2014      targetNamespace=
2015      "http://docs.oasis-open.org/wsrf/200503/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
2016      >
2017      <xsd:import
2018          namespace=
2019          "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-BaseFaults-1.2-draft-04.xsd"
2020          schemaLocation=
2021          " http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-BaseFaults-1.2-draft-04.xsd"
2022          />
2023      <!-- ===== Resource Property Related ===== -->
2024      <!-- ===== Resource Properties for QueryResourceProperties ===== -->
2025      <xsd:element name="QueryExpressionDialect" type="xsd:anyURI"/>
2026
2027      <!-- ===== Global Attribute Declaration for WSDL 1.1 portType===== -->
2028      <xsd:attribute name="ResourceProperties" type="xsd:QName" />
2029
2030      <!-- = Notification Message for ResourceProperties value change === -->
2031      <xsd:complexType name="ResourcePropertyValueChangeNotificationType">
2032          <xsd:sequence>
2033              <xsd:element name="OldValues" nillable="true"
2034                  minOccurs="0" maxOccurs="1" >
2035              <xsd:complexType>
2036                  <xsd:sequence>
2037                      <xsd:any minOccurs="1" maxOccurs="unbounded" />
2038                  </xsd:sequence>
2039              </xsd:complexType>
2040          </xsd:element>
2041          <xsd:element name="NewValues" nillable="true"
2042                  minOccurs="1" maxOccurs="1" >
2043              <xsd:complexType>
2044                  <xsd:sequence>
2045                      <xsd:any minOccurs="1" maxOccurs="unbounded" />
2046                  </xsd:sequence>
2047              </xsd:complexType>
2048          </xsd:element>
2049      </xsd:sequence>
2050  </xsd:complexType>
2051
2052  <xsd:element name="ResourcePropertyValueChangeNotification"
2053      type="wsrf-rp:ResourcePropertyValueChangeNotificationType" />
2054
2055  <xsd:complexType name="QueryExpressionType" mixed="true">
2056      <xsd:sequence>
2057          <xsd:any minOccurs="0" maxOccurs="1" processContents="lax" />
2058      </xsd:sequence>

```

```

2059 <xsd:attribute name="Dialect" type="xsd:anyURI" />
2060 </xsd:complexType>
2061
2062 <xsd:element name="QueryExpression" type="wsrf-rp:QueryExpressionType" />
2063
2064 <!-- ===== Message Types for GetResourcePropertyDocument ===== -->
2065
2066 <xsd:element name="GetResourcePropertyDocument">
2067   <xsd:complexType/>
2068 </xsd:element>
2069
2070 <xsd:element name="GetResourcePropertyDocumentResponse">
2071   <xsd:complexType>
2072     <xsd:sequence>
2073       <xsd:any minOccurs="1" maxOccurs="1"/>
2074     </xsd:sequence>
2075   </xsd:complexType>
2076 </xsd:element>
2077
2078 <!-- ===== Message Types for GetResourceProperty ===== -->
2079
2080 <xsd:element name="GetResourceProperty"
2081   type="xsd:QName" />
2082
2083 <xsd:element name="GetResourcePropertyResponse" >
2084   <xsd:complexType>
2085     <xsd:sequence>
2086       <xsd:any minOccurs="0" maxOccurs="unbounded" />
2087     </xsd:sequence>
2088   </xsd:complexType>
2089 </xsd:element>
2090
2091 <xsd:complexType name="InvalidResourcePropertyQNameFaultType">
2092   <xsd:complexContent>
2093     <xsd:extension base="wsrf-bf:BaseFaultType"/>
2094   </xsd:complexContent>
2095 </xsd:complexType>
2096 <xsd:element name="InvalidResourcePropertyQNameFault"
2097   type="wsrf-rp:InvalidResourcePropertyQNameFaultType"/>
2098
2099 <!-- ===== Message Types for GetMultipleResourceProperties ===== -->
2100 <xsd:element name="GetMultipleResourceProperties">
2101   <xsd:complexType>
2102     <xsd:sequence>
2103       <xsd:element name="ResourceProperty" type="xsd:QName"
2104         minOccurs="1" maxOccurs="unbounded" />
2105     </xsd:sequence>
2106   </xsd:complexType>
2107 </xsd:element>

```

```
2108
2109     <xsd:element name="GetMultipleResourcePropertiesResponse">
2110         <xsd:complexType>
2111             <xsd:sequence>
2112                 <xsd:any minOccurs="0" maxOccurs="unbounded" />
2113             </xsd:sequence>
2114         </xsd:complexType>
2115     </xsd:element>
2116
2117     <!-- ===== Message Types for PutResourceProperty ===== -->
2118
2119     <xsd:element name="PutResourcePropertyDocument">
2120         <xsd:complexType>
2121             <xsd:sequence>
2122                 <xsd:any minOccurs="1" maxOccurs="1"/>
2123             </xsd:sequence>
2124         </xsd:complexType>
2125     </xsd:element>
2126
2127     <xsd:element name="PutResourcePropertyDocumentResponse">
2128         <xsd:complexType>
2129             <xsd:sequence>
2130                 <xsd:any minOccurs="0" maxOccurs="1"/>
2131             </xsd:sequence>
2132         </xsd:complexType>
2133     </xsd:element>
2134
2135     <xsd:complexType name="ResourcePropertyChangeFailureType">
2136         <xsd:sequence>
2137             <xsd:element name="CurrentValue" minOccurs="0" maxOccurs="1">
2138                 <xsd:complexType>
2139                     <xsd:sequence>
2140                         <xsd:any minOccurs="1" maxOccurs="unbounded" />
2141                     </xsd:sequence>
2142                 </xsd:complexType>
2143             </xsd:element>
2144             <xsd:element name="RequestedValue" minOccurs="0" maxOccurs="1">
2145                 <xsd:complexType>
2146                     <xsd:sequence>
2147                         <xsd:any minOccurs="1" maxOccurs="unbounded" />
2148                     </xsd:sequence>
2149                 </xsd:complexType>
2150             </xsd:element>
2151         </xsd:sequence>
2152             <xsd:attribute name="Restored" type="xsd:boolean"/>
2153         </xsd:complexType>
2154
2155     <xsd:complexType
2156         name="UnableToPutResourcePropertyDocumentFaultType">
```

```

2157 <xsd:complexContent>
2158   <xsd:extension base="wsrf-bf:BaseFaultType">
2159     <xsd:sequence>
2160       <xsd:element name="ResourcePropertyChangeFailure" type=
2161                     "wsrf-rp:ResourcePropertyChangeFailureType"/>
2162     </xsd:sequence>
2163   </xsd:extension>
2164 </xsd:complexContent>
2165 </xsd:complexType>
2166 <xsd:element name="UnableToPutResourcePropertyDocumentFault"
2167   type=
2168   "wsrf-rp:UnableToPutResourcePropertyDocumentFaultType"/>
2169
2170 <!-- ===== Message Types for SetResourceProperties ===== -->
2171
2172 <xsd:complexType name="InsertType">
2173   <xsd:sequence>
2174     <xsd:any processContents="lax"
2175       minOccurs="1" maxOccurs="unbounded" />
2176   </xsd:sequence>
2177 </xsd:complexType>
2178 <xsd:element name="Insert" type="wsrf-rp:InsertType"/>
2179
2180 <xsd:complexType name="UpdateType">
2181   <xsd:sequence>
2182     <xsd:any processContents="lax"
2183       minOccurs="1" maxOccurs="unbounded" />
2184   </xsd:sequence>
2185 </xsd:complexType>
2186 <xsd:element name="Update" type="wsrf-rp:UpdateType"/>
2187
2188 <xsd:complexType name="DeleteType">
2189   <xsd:attribute name="ResourceProperty"
2190     type="xsd:QName" use="required" />
2191 </xsd:complexType>
2192 <xsd:element name="Delete" type="wsrf-rp:DeleteType"/>
2193
2194 <xsd:element name="SetResourceProperties">
2195   <xsd:complexType>
2196     <xsd:choice minOccurs="0" maxOccurs="unbounded">
2197       <xsd:element ref="wsrf-rp:Insert"/>
2198       <xsd:element ref="wsrf-rp:Update"/>
2199       <xsd:element ref="wsrf-rp:Delete"/>
2200     </xsd:choice>
2201   </xsd:complexType>
2202 </xsd:element>
2203
2204 <xsd:element name="SetResourcePropertiesResponse" >
2205   <xsd:complexType />

```

```

2206 </xsd:element>
2207
2208 <xsd:complexType
2209     name="InvalidSetResourcePropertiesRequestContentFaultType">
2210     <xsd:complexContent>
2211         <xsd:extension base="wsrf-bf:BaseFaultType">
2212             <xsd:sequence>
2213                 <xsd:element name="ResourcePropertyChangeFailure" type=
2214                     "wsrf-rp:ResourcePropertyChangeFailureType"/>
2215             </xsd:sequence>
2216         </xsd:extension>
2217     </xsd:complexContent>
2218 </xsd:complexType>
2219 <xsd:element name=
2220     "InvalidSetResourcePropertiesRequestContentFault"
2221     type=
2222     "wsrf-rp:InvalidSetResourcePropertiesRequestContentFaultType"/>
2223
2224 <xsd:complexType name="UnableToModifyResourcePropertyFaultType">
2225     <xsd:complexContent>
2226         <xsd:extension base="wsrf-bf:BaseFaultType">
2227             <xsd:sequence>
2228                 <xsd:element name="ResourcePropertyChangeFailure" type=
2229                     "wsrf-rp:ResourcePropertyChangeFailureType"/>
2230             </xsd:sequence>
2231         </xsd:extension>
2232     </xsd:complexContent>
2233 </xsd:complexType>
2234 <xsd:element name="UnableToModifyResourcePropertyFault"
2235     type="wsrf-rp:UnableToModifyResourcePropertyFaultType"/>
2236
2237 <xsd:complexType name="SetResourcePropertyRequestFailedFaultType">
2238     <xsd:complexContent>
2239         <xsd:extension base="wsrf-bf:BaseFaultType">
2240             <xsd:sequence>
2241                 <xsd:element name="ResourcePropertyChangeFailure" type=
2242                     "wsrf-rp:ResourcePropertyChangeFailureType"/>
2243             </xsd:sequence>
2244         </xsd:extension>
2245     </xsd:complexContent>
2246 </xsd:complexType>
2247 <xsd:element name="SetResourcePropertyRequestFailedFault"
2248     type=
2249     "wsrf-rp:SetResourcePropertyRequestFailedFaultType"/>
2250
2251 <xsd:complexType name="InsertResourcePropertyRequestFailedFaultType">
2252     <xsd:complexContent>
2253         <xsd:extension base="wsrf-bf:BaseFaultType">
2254             <xsd:sequence>

```

```

2255     <xsd:element name="ResourcePropertyChangeFailure" type=
2256                     "wsrf-rp:ResourcePropertyChangeFailureType"/>
2257     </xsd:sequence>
2258   </xsd:extension>
2259   </xsd:complexContent>
2260 </xsd:complexType>
2261 <xsd:element name="InsertResourcePropertyRequestFailedFault"
2262             type=
2263             "wsrf-rp:InsertResourcePropertyRequestFailedFaultType"/>
2264
2265 <xsd:complexType
2266   name="InvalidInsertResourcePropertiesRequestContentFaultType">
2267   <xsd:complexContent>
2268     <xsd:extension base="wsrf-bf:BaseFaultType">
2269       <xsd:sequence>
2270         <xsd:element name="ResourcePropertyChangeFailure" type=
2271                         "wsrf-rp:ResourcePropertyChangeFailureType"/>
2272       </xsd:sequence>
2273     </xsd:extension>
2274   </xsd:complexContent>
2275 </xsd:complexType>
2276 <xsd:element
2277   name="InvalidInsertResourcePropertiesRequestContentFault"
2278   type=
2279   "wsrf-rp:InvalidInsertResourcePropertiesRequestContentFaultType"/>
2280
2281 <xsd:complexType
2282   name="InvalidUpdateResourcePropertiesRequestContentFaultType">
2283   <xsd:complexContent>
2284     <xsd:extension base="wsrf-bf:BaseFaultType">
2285       <xsd:sequence>
2286         <xsd:element name="ResourcePropertyChangeFailure" type=
2287                         "wsrf-rp:ResourcePropertyChangeFailureType"/>
2288       </xsd:sequence>
2289     </xsd:extension>
2290   </xsd:complexContent>
2291 </xsd:complexType>
2292 <xsd:element
2293   name="InvalidUpdateResourcePropertiesRequestContentFault"
2294   type=
2295   "wsrf-rp:InvalidUpdateResourcePropertiesRequestContentFaultType"/>
2296
2297 <xsd:complexType name="UpdateResourcePropertyRequestFailedFaultType">
2298   <xsd:complexContent>
2299     <xsd:extension base="wsrf-bf:BaseFaultType">
2300       <xsd:sequence>
2301         <xsd:element name="ResourcePropertyChangeFailure" type=
2302                         "wsrf-rp:ResourcePropertyChangeFailureType"/>
2303       </xsd:sequence>

```

```

2304     </xsd:extension>
2305     </xsd:complexContent>
2306   </xsd:complexType>
2307   <xsd:element
2308     name="UpdateResourcePropertyRequestFailedFault"
2309     type="wsrf-rp:UpdateResourcePropertyRequestFailedFaultType"/>
2310
2311   <xsd:complexType name="DeleteResourcePropertyRequestFailedFaultType">
2312     <xsd:complexContent>
2313       <xsd:extension base="wsrf-bf:BaseFaultType">
2314         <xsd:sequence>
2315           <xsd:element name="ResourcePropertyChangeFailure" type=
2316             "wsrf-rp:ResourcePropertyChangeFailureType"/>
2317         </xsd:sequence>
2318       </xsd:extension>
2319     </xsd:complexContent>
2320   </xsd:complexType>
2321   <xsd:element
2322     name="DeleteResourcePropertyRequestFailedFault"
2323     type="wsrf-rp:DeleteResourcePropertyRequestFailedFaultType"/>
2324
2325   <!-- ===== Message Types for InsertResourceProperties ===== -->
2326   <xsd:element name="InsertResourceProperties">
2327     <xsd:complexType>
2328       <xsd:sequence>
2329         <xsd:element ref="wsrf-rp:Insert"/>
2330       </xsd:sequence>
2331     </xsd:complexType>
2332   </xsd:element>
2333
2334   <xsd:element name="InsertResourcePropertiesResponse" >
2335     <xsd:complexType />
2336   </xsd:element>
2337
2338   <!-- ===== Message Types for UpdateResourceProperties ===== -->
2339   <xsd:element name="UpdateResourceProperties">
2340     <xsd:complexType>
2341       <xsd:sequence>
2342         <xsd:element ref="wsrf-rp:Update"/>
2343       </xsd:sequence>
2344     </xsd:complexType>
2345   </xsd:element>
2346
2347   <xsd:element name="UpdateResourcePropertiesResponse" >
2348     <xsd:complexType />
2349   </xsd:element>
2350
2351   <!-- ===== Message Types for DeleteResourceProperties ===== -->
2352   <xsd:element name="DeleteResourceProperties">
```

```
2353 <xsd:complexType>
2354   <xsd:sequence>
2355     <xsd:element ref="wsrf-rp:Delete"/>
2356   </xsd:sequence>
2357 </xsd:complexType>
2358 </xsd:element>
2359
2360 <xsd:element name="DeleteResourcePropertiesResponse" >
2361   <xsd:complexType />
2362 </xsd:element>
2363
2364 <!-- ===== Message Types for QueryResourceProperties ===== -->
2365
2366 <xsd:element name="QueryResourceProperties" >
2367   <xsd:complexType>
2368     <xsd:sequence>
2369       <xsd:element ref="wsrf-rp:QueryExpression"
2370         minOccurs="1" maxOccurs="1"/>
2371     </xsd:sequence>
2372   </xsd:complexType>
2373 </xsd:element>
2374
2375 <xsd:element name="QueryResourcePropertiesResponse" >
2376   <xsd:complexType>
2377     <xsd:complexContent mixed="true">
2378       <xsd:restriction base="xsd:anyType">
2379         <xsd:sequence>
2380           <xsd:any processContents="lax"
2381             minOccurs="1" maxOccurs="unbounded"/>
2382         </xsd:sequence>
2383       </xsd:restriction>
2384     </xsd:complexContent>
2385   </xsd:complexType>
2386 </xsd:element>
2387
2388 <xsd:complexType name="UnknownQueryExpressionDialectFaultType">
2389   <xsd:complexContent>
2390     <xsd:extension base="wsrf-bf:BaseFaultType"/>
2391   </xsd:complexContent>
2392 </xsd:complexType>
2393 <xsd:element name="UnknownQueryExpressionDialectFault"
2394   type="wsrf-rp:UnknownQueryExpressionDialectFaultType"/>
2395
2396 <xsd:complexType name="InvalidQueryExpressionFaultType">
2397   <xsd:complexContent>
2398     <xsd:extension base="wsrf-bf:BaseFaultType"/>
2399   </xsd:complexContent>
2400 </xsd:complexType>
2401 <xsd:element name="InvalidQueryExpressionFault"
```

```
2402           type="wsrf-rp:InvalidQueryExpressionFaultType"/>
2403
2404 <xsd:complexType name="QueryEvaluationErrorFaultType">
2405   <xsd:complexContent>
2406     <xsd:extension base="wsrf-bf:BaseFaultType"/>
2407   </xsd:complexContent>
2408 </xsd:complexType>
2409 <xsd:element name="QueryEvaluationErrorFault"
2410   type="wsrf-rp:QueryEvaluationErrorFaultType"/>
2411
2412 </xsd:schema>
```

2413 **Appendix C. WSDL 1.1**

2414 The WSDL 1.1 for the Web service methods described in this specification is compliant
2415 with WS-I Basic Profile 1.1 and is included here for convenience. The authoritative
2416 version of this WSDL is available at:

2417 <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.wsdl>

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2455
2456 -->

2457
2458 <wsdl:definitions name="WS-ResourceProperties"

```

2459 xmlns="http://schemas.xmlsoap.org/wsdl/"
2460 xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
2461 xmlns:xsd="http://www.w3.org/2001/XMLSchema"
2462 xmlns:wsbf=
2463 "http://docs.oasis-open.org/wsrf/200503/03/wsrf-WS-BaseFaults-1.2-draft-04.xsd"
2464 xmlns:wsrf-rp=
2465 "http://docs.oasis-open.org/wsrf/200503/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
2466 xmlns:wsrf-rpw=
2467 "http://docs.oasis-open.org/wsrf/200503/03/wsrf-WS-ResourceProperties-1.2-draft-06.wsdl"
2468 xmlns:wsrf-rw=
2469 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-Resource-1.2-draft-0303.wsdl"
2470 targetNamespace=
2471 "http://docs.oasis-open.org/wsrf/200503/03/wsrf-WS-ResourceProperties-1.2-draft-06.wsdl"
2472 >
2473
2474
2475 <!-- ===== Imports ===== -->
2476
2477 <wsdl:import
2478   namespace=
2479   "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-Resource-1.2-draft-0303.wsdl"
2480   location=
2481   "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-Resource-1.2-draft-0303.wsdl" />
2482
2483 <!-- ===== Types Definitions ===== -->
2484 <wsdl:types>
2485   <xsd:schema>
2486     <xsd:import
2487       namespace=
2488       "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
2489       schemaLocation=
2490       " http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd" />
2491     </xsd:schema>
2492   </wsdl:types>
2493
2494 <!-- ===== GetResourcePropertyDocument =====
2495   GetResourcePropertyDocument()
2496   returns: any
2497 -->
2498 <wsdl:message name="GetResourcePropertyDocumentRequest">
2499   <wsdl:part name="GetResourcePropertyDocumentRequest"
2500     element="wsrf-rp:GetResourcePropertyDocument"/>
2501 </wsdl:message>
2502
2503 <wsdl:message name="GetResourcePropertyDocumentResponse">
2504   <wsdl:part name="GetResourcePropertyDocumentResponse"
2505     element="wsrf-rp:GetResourcePropertyDocumentResponse"/>
2506 </wsdl:message>
2507

```

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2508 <!-- ===== GetResourceProperty =====
2509   GetResourceProperty(QName)
2510   returns: any
2511 -->
2512   <wsdl:message name="GetResourcePropertyRequest">
2513     <wsdl:part name="GetResourcePropertyRequest"
2514       element="wsrf-rp:GetResourceProperty" />
2515   </wsdl:message>
2516
2517   <wsdl:message name="GetResourcePropertyResponse">
2518     <wsdl:part name="GetResourcePropertyResponse"
2519       element="wsrf-rp:GetResourcePropertyResponse" />
2520   </wsdl:message>
2521
2522   <wsdl:message name="InvalidResourcePropertyQNameFault">
2523     <part name="InvalidResourcePropertyQNameFault"
2524       element="wsrf-rp:InvalidResourcePropertyQNameFault" />
2525   </wsdl:message>
2526
2527 <!-- =====GetMultipleResourceProperties =====
2528   GetMultipleResourceProperties(list of QName)
2529   returns: sequence of any
2530 -->
2531   <wsdl:message name="GetMultipleResourcePropertiesRequest">
2532     <wsdl:part name="GetMultipleResourcePropertiesRequest"
2533       element="wsrf-rp:GetMultipleResourceProperties" />
2534   </wsdl:message>
2535
2536   <wsdl:message name="GetMultipleResourcePropertiesResponse">
2537     <wsdl:part name="GetMultipleResourcePropertiesResponse"
2538       element="wsrf-rp:GetMultipleResourcePropertiesResponse" />
2539   </wsdl:message>
2540 <!-- ===== PutResourcePropertyDocument =====
2541   PutResourcePropertyDocument(any)
2542   returns: any?
2543 -->
2544   <wsdl:message name="PutResourcePropertyDocumentRequest">
2545     <wsdl:part name="PutResourcePropertyDocumentRequest"
2546       element="wsrf-rp:PutResourcePropertyDocument"/>
2547   </wsdl:message>
2548
2549   <wsdl:message name="PutResourcePropertyDocumentResponse">
2550     <wsdl:part name="PutResourcePropertyDocumentResponse"
2551       element="wsrf-rp:PutResourcePropertyDocumentResponse"/>
2552   </wsdl:message>
2553
2554   <wsdl:message name="UnableToPutResourcePropertyDocumentFault">
2555     <part name="UnableToPutResourcePropertyDocumentFault"
2556       element="wsrf-rp:UnableToPutResourcePropertyDocumentFault" />

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2557 </wsdl:message>
2558
2559 <!-- ===== SetResourceProperties =====-->
2560 SetResourceProperties(
2561 { insert (any)* |
2562 update (any)* |
2563 delete@QName } +
2564 )
2565 returns: empty
2566 -->
2567 <wsdl:message name="SetResourcePropertiesRequest">
2568   <wsdl:part name="SetResourcePropertiesRequest"
2569     element="wsrf-rp:SetResourceProperties" />
2570 </wsdl:message>
2571
2572 <wsdl:message name="SetResourcePropertiesResponse">
2573   <wsdl:part name="SetResourcePropertiesResponse"
2574     element="wsrf-rp:SetResourcePropertiesResponse" />
2575 </wsdl:message>
2576
2577 <wsdl:message name="InvalidSetResourcePropertiesRequestContentFault">
2578   <part name="InvalidSetResourcePropertiesRequestContentFault"
2579     element="wsrf-rp:InvalidSetResourcePropertiesRequestContentFault" />
2580 </wsdl:message>
2581
2582 <wsdl:message name="UnableToModifyResourcePropertyFault">
2583   <part name="UnableToModifyResourcePropertyFault"
2584     element="wsrf-rp:UnableToModifyResourcePropertyFault" />
2585 </wsdl:message>
2586
2587 <wsdl:message name="SetResourcePropertyRequestFailedFault">
2588   <part name="SetResourcePropertyRequestFailedFault"
2589     element="wsrf-rp:SetResourcePropertyRequestFailedFault" />
2590 </wsdl:message>
2591
2592 <!-- ===== InsertResourceProperties =====-->
2593 InsertResourceProperties((any)* )
2594 returns: empty
2595 -->
2596 <wsdl:message name="InsertResourcePropertiesRequest">
2597   <wsdl:part name="InsertResourcePropertiesRequest"
2598     element="wsrf-rp:InsertResourceProperties" />
2599 </wsdl:message>
2600
2601 <wsdl:message name="InsertResourcePropertiesResponse">
2602   <wsdl:part name="InsertResourcePropertiesResponse"
2603     element="wsrf-rp:InsertResourcePropertiesResponse" />
2604 </wsdl:message>
2605

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```

2606 <wsdl:message name="InsertResourcePropertyRequestFailedFault">
2607   <part name="InsertResourcePropertyRequestFailedFault"
2608     element="wsrf-rp:InsertResourcePropertyRequestFailedFault" />
2609 </wsdl:message>
2610
2611 <wsdl:message name="InvalidInsertResourcePropertiesRequestContentFault">
2612   <part name="InvalidInsertResourcePropertiesRequestContentFault"
2613     element="wsrf-rp:InvalidInsertResourcePropertiesRequestContentFault" />
2614 </wsdl:message>
2615
2616 <!-- ===== UpdateResourceProperties =====
2617 UpdateResourceProperties((any)* )
2618 returns: empty
2619 -->
2620 <wsdl:message name="UpdateResourcePropertiesRequest">
2621   <wsdl:part name="UpdateResourcePropertiesRequest"
2622     element="wsrf-rp:UpdateResourceProperties" />
2623 </wsdl:message>
2624
2625 <wsdl:message name="UpdateResourcePropertiesResponse">
2626   <wsdl:part name="UpdateResourcePropertiesResponse"
2627     element="wsrf-rp:UpdateResourcePropertiesResponse" />
2628 </wsdl:message>
2629
2630 <wsdl:message name="UpdateResourcePropertyRequestFailedFault">
2631   <part name="UpdateResourcePropertyRequestFailedFault"
2632     element="wsrf-rp:UpdateResourcePropertyRequestFailedFault" />
2633 </wsdl:message>
2634
2635 <wsdl:message name="InvalidUpdateResourcePropertiesRequestContentFault">
2636   <part name="InvalidUpdateResourcePropertiesRequestContentFault"
2637     element="wsrf-rp:InvalidUpdateResourcePropertiesRequestContentFault" />
2638 </wsdl:message>
2639
2640 <!-- ===== DeleteResourceProperties =====
2641 DeleteResourceProperties( ResourceProperty )
2642 returns: empty
2643 -->
2644 <wsdl:message name="DeleteResourcePropertiesRequest">
2645   <wsdl:part name="DeleteResourcePropertiesRequest"
2646     element="wsrf-rp:DeleteResourceProperties" />
2647 </wsdl:message>
2648
2649 <wsdl:message name="DeleteResourcePropertiesResponse">
2650   <wsdl:part name="DeleteResourcePropertiesResponse"
2651     element="wsrf-rp:DeleteResourcePropertiesResponse" />
2652 </wsdl:message>
2653
2654 <wsdl:message name="DeleteResourcePropertyRequestFailedFault">
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2655     <part name="DeleteResourcePropertyRequestFailedFault"
2656         element="wsrf-rp:DeleteResourcePropertyRequestFailedFault" />
2657     </wsdl:message>
2658
2659     <!-- ===== QueryResourceProperties =====-->
2660     QueryResourceProperties(QueryExpression)
2661     returns: any
2662     -->
2663     <wsdl:message name="QueryResourcePropertiesRequest">
2664         <wsdl:part name="QueryResourcePropertiesRequest"
2665             element="wsrf-rp:QueryResourceProperties" />
2666     </wsdl:message>
2667
2668     <wsdl:message name="QueryResourcePropertiesResponse">
2669         <wsdl:part name="QueryResourcePropertiesResponse"
2670             element="wsrf-rp:QueryResourcePropertiesResponse" />
2671     </wsdl:message>
2672
2673     <wsdl:message name="UnknownQueryExpressionDialectFault">
2674         <part name="UnknownQueryExpressionDialectFault"
2675             element="wsrf-rp:UnknownQueryExpressionDialectFault" />
2676     </wsdl:message>
2677
2678     <wsdl:message name="InvalidQueryExpressionFault">
2679         <part name="InvalidQueryExpressionFault"
2680             element="wsrf-rp:InvalidQueryExpressionFault" />
2681     </wsdl:message>
2682
2683     <wsdl:message name="QueryEvaluationErrorFault">
2684         <part name="QueryEvaluationErrorFault"
2685             element="wsrf-rp:QueryEvaluationErrorFault" />
2686     </wsdl:message>
2687
2688     <!-- ===== PortType Definitions ===== -->
2689     <wsdl:portType name="GetResourcePropertyDocument">
2690         <wsdl:operation name="GetResourcePropertyDocument">
2691             <wsdl:input name="GetResourcePropertyDocumentRequest"
2692                 message="wsrf-rpw:GetResourcePropertyDocumentRequest"/>
2693             <wsdl:output name="GetResourcePropertyDocumentResponse"
2694                 message="wsrf-rpw:GetResourcePropertyDocumentResponse"/>
2695             <wsdl:fault name="ResourceUnknownFault"
2696                 message="wsrf-rw:ResourceUnknownFault"/>
2697         </wsdl:operation>
2698     </wsdl:portType>
2699
2700     <wsdl:portType name="GetResourceProperty">
2701         <wsdl:operation name="GetResourceProperty">
2702             <wsdl:input name="GetResourcePropertyRequest"
2703                 message="wsrf-rpw:GetResourcePropertyRequest" />

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2704 <wsdl:output name="GetResourcePropertyResponse"
2705     message="wsrf-rpw:GetResourcePropertyResponse" />
2706 <wsdl:fault name="ResourceUnknownFault"
2707     message="wsrf-rw:ResourceUnknownFault"/>
2708 <wsdl:fault name="InvalidResourcePropertyQNameFault"
2709     message="wsrf-rpw:InvalidResourcePropertyQNameFault" />
2710 </wsdl:operation>
2711 </wsdl:portType>
2712
2713 <wsdl:portType name="GetMultipleResourceProperties">
2714 <wsdl:operation name="GetMultipleResourceProperties">
2715 <wsdl:input name="GetMultipleResourcePropertiesRequest"
2716     message="wsrf-rpw:GetMultipleResourcePropertiesRequest" />
2717 <wsdl:output name="GetMultipleResourcePropertiesResponse"
2718     message="wsrf-rpw:GetMultipleResourcePropertiesResponse" />
2719 <wsdl:fault name="ResourceUnknownFault"
2720     message="wsrf-rw:ResourceUnknownFault"/>
2721 <wsdl:fault name="InvalidResourcePropertyQNameFault"
2722     message="wsrf-rpw:InvalidResourcePropertyQNameFault" />
2723 </wsdl:operation>
2724 </wsdl:portType>
2725
2726 <wsdl:portType name="PutResourcePropertyDocument">
2727 <wsdl:operation name="PutResourcePropertyDocument">
2728 <wsdl:input name="PutResourcePropertyDocumentRequest"
2729     message="wsrf-rpw:PutResourcePropertyDocumentRequest" />
2730 <wsdl:output name="PutResourcePropertyDocumentResponse"
2731     message="wsrf-rpw:PutResourcePropertyDocumentResponse" />
2732 <wsdl:fault name="ResourceUnknownFault"
2733     message="wsrf-rw:ResourceUnknownFault"/>
2734 <wsdl:fault name="UnableToPutResourcePropertyDocumentFault"
2735     message="wsrf-rpw:UnableToPutResourcePropertyDocumentFault" />
2736 </wsdl:operation>
2737 </wsdl:portType>
2738
2739 <wsdl:portType name="SetResourceProperties">
2740 <wsdl:operation name="SetResourceProperties">
2741 <wsdl:input name="SetResourcePropertiesRequest"
2742     message="wsrf-rpw:SetResourcePropertiesRequest" />
2743 <wsdl:output name="SetResourcePropertiesResponse"
2744     message="wsrf-rpw:SetResourcePropertiesResponse" />
2745 <wsdl:fault name="ResourceUnknownFault"
2746     message="wsrf-rw:ResourceUnknownFault"/>
2747 <wsdl:fault name="InvalidSetResourcePropertiesRequestContentFault"
2748     message="wsrf-rpw:InvalidSetResourcePropertiesRequestContentFault" />
2749 <wsdl:fault name="UnableToModifyResourcePropertyFault"
2750     message="wsrf-rpw:UnableToModifyResourcePropertyFault" />
2751 <wsdl:fault name="InvalidResourcePropertyQNameFault"
2752     message="wsrf-rpw:InvalidResourcePropertyQNameFault" />

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2753     <wsdl:fault name="SetResourcePropertyRequestFailedFault"
2754         message="wsrf-rpw:SetResourcePropertyRequestFailedFault" />
2755     </wsdl:operation>
2756 </wsdl:portType>
2757
2758 <wsdl:portType name="InsertResourceProperties">
2759     <wsdl:operation name="InsertResourceProperties">
2760         <wsdl:input name="InsertResourcePropertiesRequest"
2761             message="wsrf-rpw:InsertResourcePropertiesRequest" />
2762         <wsdl:output name="InsertResourcePropertiesResponse"
2763             message="wsrf-rpw:InsertResourcePropertiesResponse" />
2764     <wsdl:fault name="ResourceUnknownFault"
2765         message="wsrf-rw:ResourceUnknownFault"/>
2766     <wsdl:fault name="InvalidInsertResourcePropertiesRequestContentFault"
2767         message="wsrf-rpw:InvalidInsertResourcePropertiesRequestContentFault" />
2768     <wsdl:fault name="UnableToModifyResourcePropertyFault"
2769         message="wsrf-rpw:UnableToModifyResourcePropertyFault" />
2770     <wsdl:fault name="InvalidResourcePropertyQNameFault"
2771         message="wsrf-rpw:InvalidResourcePropertyQNameFault" />
2772     <wsdl:fault name="InsertResourcePropertyRequestFailedFault"
2773         message="wsrf-rpw:InsertResourcePropertyRequestFailedFault" />
2774     </wsdl:operation>
2775 </wsdl:portType>
2776
2777 <wsdl:portType name="UpdateResourceProperties">
2778     <wsdl:operation name="UpdateResourceProperties">
2779         <wsdl:input name="UpdateResourcePropertiesRequest"
2780             message="wsrf-rpw:UpdateResourcePropertiesRequest" />
2781         <wsdl:output name="UpdateResourcePropertiesResponse"
2782             message="wsrf-rpw:UpdateResourcePropertiesResponse" />
2783         <wsdl:fault name="ResourceUnknownFault"
2784             message="wsrf-rw:ResourceUnknownFault"/>
2785         <wsdl:fault name="InvalidUpdateResourcePropertiesRequestContentFault"
2786             message="wsrf-rpw:InvalidUpdateResourcePropertiesRequestContentFault" />
2787         <wsdl:fault name="UnableToModifyResourcePropertyFault"
2788             message="wsrf-rpw:UnableToModifyResourcePropertyFault" />
2789         <wsdl:fault name="InvalidResourcePropertyQNameFault"
2790             message="wsrf-rpw:InvalidResourcePropertyQNameFault" />
2791         <wsdl:fault name="UpdateResourcePropertyRequestFailedFault"
2792             message="wsrf-rpw:UpdateResourcePropertyRequestFailedFault" />
2793     </wsdl:operation>
2794 </wsdl:portType>
2795
2796 <wsdl:portType name="DeleteResourceProperties">
2797     <wsdl:operation name="DeleteResourceProperties">
2798         <wsdl:input name="DeleteResourcePropertiesRequest"
2799             message="wsrf-rpw:DeleteResourcePropertiesRequest" />
2800         <wsdl:output name="DeleteResourcePropertiesResponse"
2801             message="wsrf-rpw:DeleteResourcePropertiesResponse" />

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```
2802     <wsdl:fault name="ResourceUnknownFault"
2803         message="wsrf-rw:ResourceUnknownFault"/>
2804     <wsdl:fault name="UnableToModifyResourcePropertyFault"
2805         message="wsrf-rpw:UnableToModifyResourcePropertyFault" />
2806     <wsdl:fault name="InvalidResourcePropertyQNameFault"
2807         message="wsrf-rpw:InvalidResourcePropertyQNameFault" />
2808     <wsdl:fault name="DeleteResourcePropertyRequestFailedFault"
2809         message="wsrf-rpw:DeleteResourcePropertyRequestFailedFault" />
2810     </wsdl:operation>
2811 </wsdl:portType>
2812
2813 <wsdl:portType name="QueryResourceProperties">
2814     <wsdl:operation name="QueryResourceProperties">
2815         <wsdl:input name="QueryResourcePropertiesRequest"
2816             message="wsrf-rpw:QueryResourcePropertiesRequest" />
2817         <wsdl:output name="QueryResourcePropertiesResponse"
2818             message="wsrf-rpw:QueryResourcePropertiesResponse" />
2819         <wsdl:fault name="ResourceUnknownFault"
2820             message="wsrf-rw:ResourceUnknownFault"/>
2821         <wsdl:fault name="InvalidResourcePropertyQNameFault"
2822             message="wsrf-rpw:InvalidResourcePropertyQNameFault" />
2823         <wsdl:fault name="UnknownQueryExpressionDialectFault"
2824             message="wsrf-rpw:UnknownQueryExpressionDialectFault" />
2825         <wsdl:fault name="InvalidQueryExpressionFault"
2826             message="wsrf-rpw:InvalidQueryExpressionFault" />
2827         <wsdl:fault name="QueryEvaluationErrorFault"
2828             message="wsrf-rpw:QueryEvaluationErrorFault" />
2829     </wsdl:operation>
2830
2831 </wsdl:portType>
2832
2833 </wsdl:definitions>
```

Appendix D. Revision History

Rev	Date	By Whom	What
wd-01	2004-05-18	Steve Graham	Initial version created from submission by contributing companies. Minor modifications made to reflect OASIS formatting and the following issues: WSRF2, WSRF3, WSRF14, WSRF33.
wd-02	2004-05-31	Steve Graham, Jem Treadwell	Mods to draft 01, including hyphenation, clarification of acknowledgements section
wd-03	2004-06-04	Steve Graham	Reformat rogue Veranda text with Arial.
wd-04	2004-06-07	Steve Graham	Base faults comment on faults (align with ResourceLifetime), update date URIs to 2004/06, update URLs in references to point to .pdfs, update Acknowledgements
wd-05	2004-07-19	Jem Treadwell	Changed [State Paper] & [WS-Notification] references to public URLs.
wd-06 (wd-05.b)	2004-09-17	Steve Graham	WSRF15, WSRF16, WSRF21
wd-05.c	2004-11-22	Jem Treadwell Steve Graham	Confirm WSRF15. WSRF16, WSRF21, fix up some small typos (Jem), verify typos fixes are correct and reversion to 05.c (sgg)
wd-05.d	2004-11-22	Steve Graham	Incorporate Chairman's editorial modifications (from Ian Robinson) on Title page, namespace URIs and References section. Incorporate changes due to adoption of WS-Resource specification. Addresses: WSRF4, WSRF24, WSRF27, WSRF30, WSRF43, WSRF49, WSRF53, WSRF56
wd-05.e	2004-11-26	Ian Robinson	Handful of typos corrected.
wd-05	2004-11-30	Steve Graham	Final typos accepted, PDF generated.
wd-06.a	2005-02-18	Steve Graham	WSRF25, WSRF51, WSRF55, WSRF62, WSRF63, WSRF68, WSRF72, WSRF79, WSRF81, WSRF83, WSRF86, WSRF93, WSRF95, WSRF96

Rev	Date	By Whom	What
wd-06.b	2005-02-25	Jem Treadwell	Few minor typos etc. corrected.
wd-06.c	2005-03-07	Jem Treadwell	Updated wsa namespace reference.
wd-06.d	2005-03-24	Ian Robinson	Added ResourcePropertyChangeFailure type to schema

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