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2 **Web Services Service Group 1.2**
3 **(WS-ServiceGroup)**

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9 **Editors:**

10 Tom Maguire, IBM <tmaguire@us.ibm.com>

11 David Snelling, Fujitsu <d.snelling@fle.fujitsu.com>

12 **Abstract:**

13 A ServiceGroup is a heterogeneous by-reference collection of Web services.

14 ServiceGroups can be used to form a wide variety of collections of services or WS-
15 Resources [**WS-Resource**], including registries of services and associated WS-Resources.

16 Members of a ServiceGroup are represented using components called *entries*. A
17 ServiceGroup entry is a WS-Resource. The Web service associated with a ServiceGroup
18 entry can be composed from a variety of Web services standards including WS-
19 ResourceLifetime [**WS-ResourceLifetime**] which defines standard patterns by which
20 resources can be destroyed, WS-BaseNotification [**WS-BaseNotification**] which defines
21 how third parties may subscribe to be informed of changes to the ServiceGroup and WS-
22 ResourceProperties [**WS-ResourceProperties**] which defines how the properties of a
23 ServiceGroup and its entries are made accessible through a Web service interface.

24 **Status:**

25 This document and associated schema are published by this TC as a "working draft". It is
26 possible that it may change significantly during this process, but should nonetheless
27 provide a stable reference for discussion and early adopters' implementations.

28 Committee members should send comments on this specification to the [wsrf@lists.oasis-](mailto:wsrf@lists.oasis-open.org)
29 [open.org](mailto:wsrf-comment@lists.oasis-open.org) list. Others should subscribe to and send comments to the wsrf-
30 comment@lists.oasis-open.org list. To subscribe, send an email message to wsrf-
31 comment-subscribe@lists.oasis-open.org with the word "subscribe" as the body of the
32 message.

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

37

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79 **1 Introduction**

80 In this document, we consider a distributed computing environment consisting of Web services and
81 resources. A pattern defining the relationship between Web services and resources is detailed in
82 “Web Services Resource” **[WS-Resource]**. The term WS-Resource is used to describe the
83 relationship between a Web service and a resource.
84 This WS-ServiceGroup specification defines a means by which Web services and WS-Resources
85 can be aggregated or grouped together for a domain specific purpose. In order for requestors to
86 form meaningful queries against the contents of the ServiceGroup, membership in the group must
87 be constrained in some fashion. The constraints for membership are expressed by intension using
88 a classification mechanism. Further, the members of each intension must share a common set of
89 information over which queries can be expressed.
90 In this specification, the ServiceGroup membership rules, membership constraints and
91 classifications are expressed using the resource property model **[WS-ResourceProperties]**.
92 Groups are defined as a collection of members that meet the constraints of the group. The
93 ServiceGroupRegistration interface extends the basic ServiceGroup capabilities with message
94 exchanges for managing the membership of a ServiceGroup.
95 The ServiceGroup and ServiceGroupRegistration interfaces defined in this document are
96 commonly expected to be composed with other application domain specific interfaces, which define
97 more specialized interaction with the service group and/or with the services that are members of
98 the service group. For example, specialized interfaces may offer means of querying the contents of
99 the ServiceGroup, and for performing collective operations across members of the ServiceGroup.
100 WS-ServiceGroup is inspired by a portion of the Global Grid Forum’s “Open Grid Services
101 Infrastructure (OGSI) Version 1.0” specification **[OGSI 1.0]**.

102 **1.1 Goals and Requirements**

103 The goal of WS-ServiceGroup is to standardize the terminology, concepts, message exchanges,
104 WSDL and XML needed to express the aggregations of Web services and resources as defined by
105 the WS-Resource access pattern **[WS-Resource]**.

106 **1.1.1 Requirements**

107 This specification intends to satisfy the following requirements:

- 108 • Define the standard resource properties by which a requestor can query and retrieve contents
109 of a service group.
110 • Define the standard resource properties by which a requestor can query and retrieve details of
111 an entry in the service group.
112 • Define standard message exchanges and resource properties by which a requestor can add
113 new entries for a member in a service group.

114 **1.1.2 Non-Goals**

115 The following topics are outside the scope of this specification:

- 116 • It is not an objective of this specification to define the message exchanges representing the
117 function of a member.

118 **1.2 Notational Conventions**

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

122 When describing abstract data models, this specification uses the notational convention used by
123 the [XML-InfoSet]. Specifically, abstract property names always appear in square brackets (e.g.,
124 [some property]).

125 This specification uses a notational convention, referred to as "Pseudo-schemas" in a fashion similar
126 to the WSDL 2.0 Part 1 specification [WSDL 2.0]. A Pseudo-schema uses a BNF-style convention
127 to describe attributes and elements:

- 128 • '?' denotes optionality (i.e. zero or one occurrences),
- 129 • '*' denotes zero or more occurrences,
- 130 • '+' one or more occurrences,
- 131 • '[' and ']' are used to form groups,
- 132 • '/' represents choice.
- 133 • Attributes are conventionally assigned a value which corresponds to their type, as
134 defined in the normative schema.

```
135 <!-- sample pseudo-schema -->
136 <element
137   required_attribute_of_type_QName="xs:QName"
138   optional_attribute_of_type_string="xs:string"? >
139   <required_element />
140   <optional_element />?
141   <one_or_more_of_these_elements />+
142   [ <choice_1 /> | <choice_2 /> ]*
143 </element>
```

144 **1.3 Namespaces**

145 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-bf	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-BaseFaults-1.2-draft-04.xsd
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-rl	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceLifetime-1.2-draft-05.xsd
wsrf-rw	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-Resource-1.2-draft-03.wsdl
wsnt	http://docs.oasis-open.org/wsrf/2004/06/wsn-WS-BaseNotification-1.2-draft-01.xsd
wsrf-sg	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-1.2-draft-04.xsd
wsrf-sgw	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-1.2-draft-04.wsdl
wstop	http://docs.oasis-open.org/wsn/2004/06/wsn-WS-Topics-1.2-draft-01.xsd

146 **2 Example**

147 As an example of using a service group, let's consider a group containing services that one has
148 accessed recently. In effect, this is a Web services equivalent of a Web browser's "history" feature.
149 The services that have been accessed can implement any interface. They could be simple Web
150 services or Web services that are part of a WS-Resource, so they can have resource properties or
151 not.

152 The only constraint the group has on its members is that the membership information of the
153 members contains the date of last interaction with the service and whether the outcome or this
154 interaction was successful or not. This constraint is exposed by the following membership rule:

```
155 ...
156 <wsrf-sg:MembershipContentRule
157   ContentElements="ns1:DateOfLastInvoke ns1:Outcome" />
158 ...
```

159 In the schema for the namespace referenced by prefix ns1, ns1:DateOfLastInvoke has been
160 defined as an xsd:dateTime representing when the member service was last invoked and
161 ns1:Outcome has been defined as either "success" or "failure" and is used to represent the
162 outcome of the last invocation.

163 Let us now modify the example to one where the services invoked can only be of one of two
164 different types: either a catalog service or a purchase service. In addition, if the service invoked
165 was a purchase service, we want the amount of the purchase to be specified as a content element
166 in the membership. The set of rules to describe the constraints of this group now is:

```
167 ...
168 <wsrf-sg:MembershipContentRule
169   ContentElements="ns1:DateOfLastInvoke ns1:Outcome" />
170
171 <wsrf-sg:MembershipContentRule
172   MemberInterface="ns2:CatalogPortType"
173   ContentElements=" " />
174
175 <wsrf-sg:MembershipContentRule
176   MemberInterface="ns3:PurchasePortType"
177   ContentElements="ns3:PurchaseAmount" />
178 ...
```

179 As a result, the WS-Resource that represents the membership of a service of type
180 ns3:PurchasePortType in the service group is guaranteed to include the elements described by the
181 following pseudo-schema:

```
182 ...
```

```
183 <wsrf-sg:Content>
184   <ns1:DateOfLastInvoke>xsd:dateTime</ns1:DateOfLastInvoke>
185   <ns1:Outcome>xsd:string</ns1:Outcome>
186   <ns3:PurchaseAmount>xsd:nonNegativeInteger</ns3:PurchaseAmount>
187 </wsrf-sg:Content>
188 ...
```

189 The WS-Resource that represents the membership of a service of type ns2:CatalogPortType is not
190 required to contain the property ns3:PurchaseAmount.

191 Once this service group has been established, requestors can retrieve the composition of the
192 group, subscribe for notifications on modification of the group composition (if supported) and
193 retrieve content elements of the memberships by using the mechanisms described in this
194 specification.

195 **3 Terminology and Concepts**

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

198 **Member:**

- 199 ○ A Web service that belongs to a ServiceGroup. Note, this Web service may be a
200 component of a WS-Resource as defined in “Web Services Resources” [**WS-Resource**].

201 **ServiceGroup:**

- 202 ○ A Web service that is a collection of other Web services or WS-Resources and the
203 information that pertains to them. The purpose of the group is application domain specific.
204 The means by which the membership in the ServiceGroup is formed may be through
205 ServiceGroupRegistration, or through other means not defined by this specification.

206 **ServiceGroupEntry:**

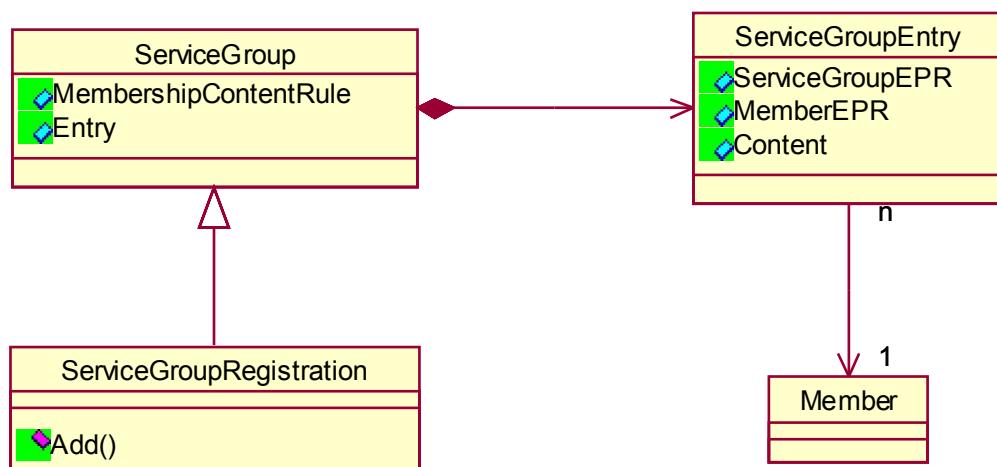
- 207 ○ An atomic entry in a ServiceGroup which associates a member to a ServiceGroup. A
208 ServiceGroupEntry also contains content information by which the member’s participation
209 in the ServiceGroup is advertised.

210 **ServiceGroupRegistration:**

- 211 ○ A ServiceGroup that provides the means to allow users of the service to explicitly insert
212 new members.

213 4 Grouping Services

214 A ServiceGroup maintains information about a collection of Web services. Each of the Web
215 services represented in the collection may be a component of a WS-Resource. These Web
216 services may be members of a ServiceGroup for a specific reason, such as being part of a
217 federated service, or they may have no specific relationship, such as the Web services contained in
218 an index or registry operated for Web service discovery purposes.
219 Three sets of message exchanges provide the interface to service groups ServiceGroup,
220 ServiceGroupEntry and ServiceGroupRegistration. The member interface is not a part of the WS-
221 ServiceGroup specification but is included for completeness. The depiction below details the
222 interfaces relevant to ServiceGroups.



223

224 **5 ServiceGroup**

225 A ServiceGroup is a WS-Resource, following the WS-Resource access pattern [**WS-Resource**],
226 which represents a collection of other Web services. The individual services represented within the
227 ServiceGroup are the ServiceGroup's members, or its membership. The model for membership of a
228 ServiceGroup is an *entry* WS-Resource. An entry WS-Resource represents an association with a
229 given member in the ServiceGroup. Additionally a ServiceGroup has the following characteristics:
230 o When a ServiceGroup WS-Resource is destroyed, all of the ServiceGroupEntry WS-
231 Resources, modeling the membership of the ServiceGroup, are also RECOMMENDED to
232 be destroyed. Note however, that the actual member Web services or WS-Resources are
233 not affected.
234 o Once a ServiceGroup is destroyed, a requestor MUST make no assumptions about either
235 the existence of the entry WS-Resources that represent the ServiceGroup membership or
236 the validity of the contents of those WS-Resources.
237 o A member MAY belong to several ServiceGroups.
238 o A member MAY belong to the same ServiceGroup more than once.
239 o The member of a ServiceGroup MAY implement message exchanges from various
240 interfaces.
241 o If a member WS-Resource is destroyed, the ServiceGroup MAY destroy the corresponding
242 entry WS-Resource that represents the membership of that WS-Resource in the
243 ServiceGroup.
244 o The grouping and membership aspects of a ServiceGroup are only manifest in the linkage
245 between a ServiceGroup and a ServiceGroupEntry. Accordingly, a ServiceGroupEntry in
246 isolation has no semantic meaning.

247 **5.1 ServiceGroup ResourceProperties**

248 In addition to the message exchanges described in this specification, a ServiceGroup MUST also
249 support the required message exchanges defined in the WS-ResourceProperties specification and
250 MAY support the optional message exchanges defined in the WS-ResourceProperties
251 specification. The resource property document defined by the ServiceGroup MUST include the
252 following resource property elements.

253 **5.1.1 MembershipContentRule Resource Property**

254 The resource property document contains a potentially empty set of MembershipContentRule
255 elements that specify the intensional constraints on *membership* of the *service group*. That is,
256 membership can be restricted to members that implement a particular interface and/or it can
257 require the presence of particular child elements in the wsrf-sg:Content resource property of the
258 ServiceGroupEntry representing the membership in the group.

259 The ServiceGroup resource property document MAY contain zero MembershipContentRule child
260 elements. When no MembershipContentRule elements are specified, the members of the
261 ServiceGroup are unconstrained. When the ServiceGroup is unconstrained any member MAY be
262 present in the ServiceGroup.

263 When at least one MembershipContentRule element specification exists, the members of the
264 ServiceGroup are constrained. When the ServiceGroup is constrained, the ServiceGroup MUST
265 NOT include a member that does not conform to at least one MembershipContentRule element. If
266 more than one rule applies to a given member all rules that apply MUST be satisfied. Membership
267 conformance to an individual MembershipContentRule is described below in the
268 MembershipContentRule component constraints.

269 The general form of a MembershipContentRule resource property element is:

```
270 <wsrf-sg:MembershipContentRule  
271     MemberInterface="QName" ?  
272     ContentElements="list of QName"  
273 />
```

274 (see [Appendix I: MembershipContentRule element definition](#) & [Appendix II: ServiceGroup resource](#)
275 [property](#))

276 This resource property element is further constrained as follows:

277 /wsrf-sg:MembershipContentRule
278 The MembershipContentRule constrains the ServiceGroup membership to those members
279 that implement the interface described below in /wsrf-
280 sg:membershipContentRule/@MemberInterface if present. A MembershipContentRule is
281 further satisfied according to the rules defined below in wsrf-
282 sg:membershipContentRule/@ContentElements.

283 /wsrf-sg:membershipContentRule/@MemberInterface
284 This optional attribute, when present, specifies the members to which this
285 MembershipContentRule applies according to the interface (WSDL 1.1 portType) of the
286 member Web service. For MembershipContentRules where @MemberInterface is
287 specified, there MUST be at most one MembershipContentRule for any given value of
288 @MemberInterface.

289 A MembershipContentRule applies to a member if the value of @MemberInterface
290 matches the QName of the member's interface. Two QNames are equivalent when they
291 have the same [local part](#) and they have [prefixes](#) which have been bound to [namespace](#)
292 [names](#) that are [identical](#) [\[XML-Names\]](#). If this attribute is not present, all members MUST
293 satisfy the enclosing MembershipContentRule's @ContentElements constraint.

294 /wsrf-sg:membershipContentRule/@ContentElements
295 This attribute specifies the content restrictions according to the list of QNames, each of
296 which refer to a XML Schema global element declaration. This list defines the constraints
297 on the wsrf-sg:Content resource property of the ServiceGroupEntry that MUST be satisfied

298 for membership. The list MAY be an empty list. When an empty list is specified there are
299 no content constraints on the resource properties of the ServiceGroupEntries that match
300 the enclosing MembershipContentRule.

301 A member satisfies a MembershipContentRule if, for each QName in the value of
302 @ContentElements, there is at least one child element of the wsrf-sg:Content of the
303 ServiceGroupEntry's resource properties document whose name matches that QName.
304 Two QNames are equivalent when they have the same [local part](#) and they have [prefixes](#)
305 which have been bound to [namespace names](#) that are [identical](#) [XML-Names].

306 Note: It is possible to construct a MembershipContentRule without a MemberInterface and with an
307 empty list for the ContentElements. Such a MembershipContentRule would have no effect on the
308 membership as per the normative semantics described for this component.

5.1.2 Entry Resource Property

310 An Entry resource property is a projection of the aggregation of the resource property documents of
311 the ServiceGroup's entry resources. An Entry resource property has the following form:

```
312 <wsrf-sg:Entry>
313   <wsrf-sg:ServiceGroupEntryEPR>
314     wsa:EndpointReferenceType
315   </wsrf-sg:ServiceGroupEntryEPR>
316   <wsrf-sg:MemberServiceEPR>
317     wsa:EndpointReferenceType
318   </wsrf-sg:MemberServiceEPR>
319   <wsrf-sg:Content> {any} </wsrf-sg:Content> ?
320 </wsrf-sg:Entry>
```

321 (see [Appendix I: Entry type and element definition](#) & [Appendix II: ServiceGroup resource property](#))

322 This resource property element is further constrained as follows

323 /wsrf-sg:Entry

324 The entry provides the logical structure of the constituent members of the ServiceGroup.
325 There is one entry element for each entry in the ServiceGroup. In the event of an entry's
326 removal or destruction from a ServiceGroup, the corresponding element in the
327 ServiceGroup's resource property MUST also be removed. The removal of the element
328 from the ServiceGroup's resource property SHOULD occur temporally near the removal or
329 destruction of the entry.

330 /wsrf-sg:Entry/ServiceGroupEntryEPR

331 Endpoint reference as defined in [[WS-Addressing](#)] to the ServiceGroupEntry WS-
332 Resource with which the entry is associated. This WS-Resource is the representation of
333 the membership of the member in the group. Existence of this WS-Resource is the
334 definitive test that the member is indeed part of the group. If the WS-Resource referenced
335 by ServiceGroupEntryEPR is not available, the consumer MUST NOT assume that the
336 Web service referenced

337 by the @MemberServiceEPR is a member of the service group.
338 /wsrf-sg:Entry/MemberServiceEPR
339 Endpoint reference as defined in [WS-Addressing] to the member to which the entry
340 refers.
341 /wsrf-sg:Entry/Content
342 The optional Content element contains the resource property values that conform to the
343 wsrf-sg:MembershipContentRule/@ContentElements of the ServiceGroup. In the absence
344 of concurrency controls a requestor MUST NOT assume that this element will be identical
345 to the element that the WS-Resource, referenced by @ServiceGroupEntryEPR, contains in
346 its wsrf-sg:Content resource property. In the case that wsrf-sg:Entry/Content is not
347 identical to the wsrf-sg:Content resource property of the WS-Resource referenced by the
348 @ServiceGroupEntryEPR then the wsrf-sg:Content is assumed to be authoritative. (For
349 further discussion reference "ACID Properties of Operations on WS-Resources" [WS-
350 ResourceProperties])

351 **5.2 ServiceGroup: Operations**

352 The ServiceGroup interface defines no message exchanges. A ServiceGroup SHOULD implement
353 one of the message exchange sets defined in WS-ResourceLifetime if it needs to support either
354 immediate resource destruction or scheduled resource destruction.

355 **6 ServiceGroupEntry**

356 The representation of a member Web service within the ServiceGroup is a WS-Resource. The
357 Web service component of this WS-Resource implements the ServiceGroupEntry interface. The
358 ServiceGroupEntry interface describes the requirements on the Web service through which
359 management of the entry occurs.

360 A member MAY appear in a ServiceGroup multiple times. A separate ServiceGroupEntry WS-
361 Resource represents each appearance of that member in a ServiceGroup. A ServiceGroupEntry
362 WS-Resource MUST belong to exactly one service group.

363 A ServiceGroupEntry interface MAY provide additional management functions for a
364 ServiceGroupEntry WS-Resource. In particular, it MAY provide independent lifetime management
365 functions for individual ServiceGroupEntry WS-Resources (if it implements message exchanges
366 defined in WS-ResourceLifetime). In the case where the ServiceGroupEntry Web service
367 implements one of the message exchange sets defined in WS-ResourceLifetime, a
368 ServiceGroupEntry WS-Resource MAY be removed from a ServiceGroup by managing the lifetime
369 of the ServiceGroupEntry WS-Resource. Additional message exchanges MAY be defined to
370 provide more advanced ServiceGroupEntry capabilities.

371 **6.1 ServiceGroupEntry: Resource Property Declarations**

372 In addition to the message exchanges described in this specification, a ServiceGroupEntry MUST
373 also support the required message exchanges defined in the WS-ResourceProperties specification
374 and MAY support the optional message exchanges defined in the WS-ResourceProperties
375 specification.

376 **6.1.1 ServiceGroupEPR**

377 The general form of a ServiceGroupEPR resource property element is:

```
378 <wsrf-sg:ServiceGroupEPR>
379   wsa:EndpointReferenceType
380 </wsrf-sg:ServiceGroupEPR>
```

381 (see [Appendix I: ServiceGroupEPR element definition](#) & [Appendix II: ServiceGroupEntry resource](#)
382 [property](#))

383 This resource property element is further constrained as follows:

384 /wsrf-sg:ServiceGroupEPR

385 Contains an endpoint reference [**WS-Addressing**] to the ServiceGroup of which this entry
386 represents membership. This endpoint reference MUST refer to the same Web service or
387 WS-Resource throughout the lifetime of the ServiceGroupEntry.

388 **6.1.2 MemberEPR**

389 The general form of a MemberEPR resource property element is:

```
390     <wsrf-sg:MemberEPR>
391         wsa:EndpointReferenceType
392     </wsrf-sg:MemberEPR>
```

393 (see [Appendix I: MemberEPR element definition](#) & [Appendix II: ServiceGroupEntry resource property](#))

395 This resource property element is further constrained as follows:

396 /wsrf-sg:MemberEPR

397 Contains an endpoint reference [**WS-Addressing**] to the member to which this entry
398 pertains. This endpoint reference MUST refer to the same Web service or WS-Resource
399 throughout the lifetime of the ServiceGroupEntry.

400 6.1.3 Content

401 The general form of the Content resource property element is:

```
402     <wsrf-sg:Content>
403         {any}
404     </wsrf-sg:Content>
```

405 (see [Appendix I: Content element definition](#) & [Appendix II: ServiceGroupEntry resource property](#))

406 This resource property element is further constrained as follows:

407 /wsrf-sg:Content

408 This XML element contains information pertinent to the group membership represented by
409 the ServiceGroupEntry. The Content elements conform to the XSD element declarations
410 listed (by QName) in the membershipContentRule resource property of the ServiceGroup
411 containing this ServiceGroupEntry.

412 6.2 ServiceGroupEntry: Message Exchanges

413 The ServiceGroupEntry interface defines no operations. The service implementing the
414 ServiceGroupEntry interface SHOULD implement the message exchanges and resource properties
415 from one of the interfaces described in WS-ResourceLifetime if it supports immediate destruction
416 and scheduled destruction of ServiceGroupEntry resources. In addition, the service implementing
417 the ServiceGroupEntry interface SHOULD implement the message exchanges and resource
418 properties for the NotificationProducer interface [**WS-BaseNotification**]. The service implementing
419 the ServiceGroupEntry SHOULD also support resource property value change notification as
420 defined in [**WS-ResourceProperties**]. In particular, it SHOULD include wsrf-sg:Content as a value
421 of its Topics resource property.

422 **7 ServiceGroupRegistration**

423 The ServiceGroupRegistration interface is an extension of the ServiceGroup interface.
424 ServiceGroupRegistration defines the message exchanges that allow a requestor to add entries to
425 a ServiceGroup WS-Resource explicitly. Third party controlled aggregations of services are made
426 possible by the ServiceGroupRegistration extension of ServiceGroup.

427 **7.1 ServiceGroupRegistration: Resource Property Declarations**

428 The ServiceGroupRegistration interface defines no resource properties. The resource properties
429 defined by the interfaces in WS-ResourceLifetime SHOULD be included in the ResourceProperty
430 document of a ServiceGroupRegistration. The resource properties defined in the ServiceGroup
431 interface MUST be included in the resource property document of a ServiceGroupRegistration.

432 **7.2 Add**

433 When a requestor wishes to add a new entry to a ServiceGroup WS-Resource, the requestor must
434 issue a request message of the following form:

```
435 <wsrf-sg:Add>
436   <wsrf-sg:MemberEPR>
437     wsa:EndpointReferenceType
438   </wsrf-sg:MemberEPR>
439   <wsrf-sg:Content>
440     {any}
441   </wsrf-sg:Content>
442   <wsrf-sg:InitialTerminationTime>
443     xsd:dateTime
444   </wsrf-sg:InitialTerminationTime>?
445 </wsrf-sg:Add>
```

446 The components of the Add message are further described as follows:

447 /wsrf-sg:Add/MemberEPR

448 This component contains the endpoint reference of the member Web service to include in
449 the ServiceGroup. It MUST satisfy the semantics as specified by the ServiceGroup
450 resource property /wsrf-sg:MembershipContentRules.

451 /wsrf-sg:Add/Content

452 This component contains information to associate with the MemberEPR in the
453 ServiceGroup. This component MUST be an element that conforms to those
454 MembershipContentRules that apply to the member within the ServiceGroup. This
455 component represents input for the ServiceGroupEntry content element. This input MAY be
456 augmented or modified with other information that the ServiceGroup may derive. This
457 allows the ServiceGroup to tailor or modify the content.

458 /wsrf-sg:Add/InitialTerminationTime
459 An optional element, indicating the requestor's suggestion for the initial setting of the
460 termination time resource property [**WS-ResourceLifetime**] of the ServiceGroupEntry WS-
461 Resource.
462 If a SOAPAction URI is included in the transport portion of the Add message, it MUST contain the
463 URI <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-1.2-draft-04.wsdl/ServiceGroupRegistration/AddRequest>.
465 If the ServiceGroupRegistration accepts the request to add a member, it MUST respond with an
466 AddResponse message of the following form:
467 <wsrf-sg:AddResponse>
468 wsa:endpointReferenceType
469 </wsrf-sg:AddResponse>
470 The content of an AddResponse message is an EndpointReference as described in [**WS-Addressing**]. This endpoint reference refers to the ServiceGroupEntry WS-Resource created by
471 the ServiceGroup to represent the association of the member within the ServiceGroup. The Web
472 service associated with the ServiceGroupEntry returned by the AddResponse MUST implement the
473 message exchanges and resource properties specified by the ScheduledResourceTermination
474 interface and the ImmediateResourceTermination interface [**WS-ResourceLifetime**].
476 If a SOAPAction URI is included in the transport portion of the AddResponse message, it MUST
477 contain the URI <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-1.2-draft-04.wsdl/ServiceGroupRegistration/AddResponse>.
479 Instead of the AddResponse message, the Web service may also send the following faults in
480 response to an Add message. For those faults associated with failure to process an Add message
481 ContentCreationFailedFault:
482 The operation was unable to create a valid Content element (as defined by the
483 membershipContentRule resource property) from the provided Content and MemberEPR
484 components of the Add request message.
485 UnsupportedMemberInterfaceFault:
486 The member service referred to by the MemberEPR argument is not conformant with the
487 MembershipContentRule.
488 AddRefusedFault:
489 The ServiceGroupRegistration refused to create a new entry for the member service based
490 the semantics of the ServiceGroupRegistration (or subtype).
491 ResourceUnknownFault:
492 The ServiceGroupRegistration WS-Resource, which is the target of the Add message, is
493 unknown. The enumeration of this fault and the conditions under which it may occur
494 appear in the [**WS-Resource**] specification.
495

496 **7.2.1 Example SOAP Encoding of the Add Message Exchange**

497 The following is a non-normative example of an Add request message using SOAP 1.2 [**SOAP 1.2**].
498 Note: The presence of ReferenceProperties in the following example represents the special case
499 when the member is a WS-Resource with a WS-Addressing embodiment [**WS-Resource**]

```
500    <s12:Envelope
501        xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
502        xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
503        xmlns:wsnt=
504            "http://docs.oasis-open.org/wsrf/2004/06/wsnt-WS-
505            BaseNotification-1.2-draft-01.xsd"
506        xmlns:wsrf-rl=
507            "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
508            ResourceLifetime-1.2-draft-05.xsd"
509        xmlns:wsrf-sg=
510            "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
511            ServiceGroup-1.2-draft-05.xsd"
512        xmlns:npex="http://www.producer.org/RefProp">
513        <s12:Header>
514            <wsa:Action>
515                http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
516                ServiceGroup-1.2-draft.04.wsdl/ServiceGroupRegistration/AddRequest
517            </wsa:Action>
518            <wsa:To s12:mustUnderstand="1">
519                http://www.producer.org/ServiceGroupEndpoint
520            </wsa:To>
521        </s12:Header>
522        <s12:Body>
523            <wsrf-sg:Add>
524                <wsrf-sg:MemberEPR>
525                    <wsa:Address>
526                        http://www.producer.org/ProducerEndpoint
527                    </wsa:Address>
528                    <wsa:ReferenceProperties>
529                        <npex:ResourceDisambiguator>
530                            uuid:84decd55-7d3f-65ad-ac44-675d9fce5d22
531                        </npex:ResourceDisambiguator>
532                    </wsa:ReferenceProperties>
533                </wsrf-sg:MemberEPR>
534                </wsrf-sg:Content>
535                    <wstop:Topic>wsrf-
536                    rp:ResourcePropertiesValueChanges</wstop:Topic>
```

```
537     <wsrf-sg:Content>
538     <wsrf-sg:InitialTerminationTime>
539         2003-12-25T00:00:00.00000Z
540     </wsrf-sg:InitialTerminationTime>
541     </wsrf-sg:Add>
542   </s12:Body>
543 </s12:Envelope>
```

544 The following is a non-normative example of an Add response message using SOAP 1.2 [SOAP
545 1.22]:

```
546 <s12:Envelope
547   xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
548   xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
549   xmlns:npex="http://www.consumer.org/RefProp">
550   xmlns:wsrf-sg=
551       "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
552 ServiceGroup-1.2-draft-04.xsd"
553   <s12:Header>
554     <wsa:Action>
555       http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
556 ServiceGroup-1.2-
557 draft.04.wsdl/ServiceGroupRegistration/AddResponse
558     </wsa:Action>
559     <npex:ResourceDisambiguator>
560       uuid:84decd55-7d3f-65ad-ac44-675d9fce12ef
561     </npex:ResourceDisambiguator>
562   </s12:Header>
563   <s12:Body>
564     <wsrf-sg:AddResponse>
565       <wsa:EndpointReference>
566         <wsa:Address>
567           http://www.producer.org/ServiceGroupEndpoint
568         </wsa:Address>
569         <wsa:ReferenceProperties>
570           <npex:ResourceDisambiguatore>
571             uuid:95fefeb3-f37d-5dfe-44fe-675d9fce12df
572           </npex:ResourceDisambiguator>
573           </wsa:ReferenceProperties>
574         </wsa:EndpointReference>
575       </wsrf-sg:AddResponse>
576     </s12:Body>
577 </s12:Envelope>
```

578 8 Notification of ServiceGroup Modification

579 If the Web service component of the ServiceGroup WS-Resource also implements the
580 NotificationProducer interface defined by the WS-BaseNotification specification [**WS-**
581 **BaseNotification**], then it MUST provide a topic [**WS-Topics**] to allow requestors to subscribe for
582 notification of the modification of the ServiceGroup. The form of the TopicSpace [**WS-Topics**] is:

```
583 <wstop:TopicSpace name="ServiceGroupTopicSpace"  
584   targetNamespace=  
585     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-  
586     ServiceGroup-1.2-draft-04.xsd"  
587     xmlns:wsrf-rp=  
588       "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-  
589     ResourceProperties-1.2-draft-06.xsd"  
590     xmlns:wstop=  
591       "http://docs.oasis-open.org/wsn/2004/06/wsn-WS-Topics-1.2-  
592     draft-01.xsd" >  
593     <wstop:Topic name="ServiceGroupModification" >  
594       <wstop:MessagePattern>  
595         <wsrf-rp:QueryExpression  
596           dialect="http://www.w3.org/TR/1999/REC-xpath-19991116"  
597         >  
598           boolean((/*/*EntryAdditionNotification  
599             \[namespace-uri()='http://docs.oasis-  
600             open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-1.2-draft-04.xsd' ])|  
601             /*/*EntryRemovalNotification  
602               \[namespace-uri()='http://docs.oasis-  
603               open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-1.2-draft-04.xsd' ]))  
604           boolean(/*/EntryAdditionNotification |  
605             /*/ EntryRemovalNotification)  
606           </wsrf-rp:QueryExpression>  
607         </wstop:MessagePattern>  
608       </wstop:Topic>  
609     </wstop:TopicSpace>
```

610

611 This TopicSpace defines the TopicSpace associated with the WS-ServiceGroup XML namespace
612 (<http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-1.2-draft-04.xsd>). The TopicSpace
613 is further constrained as follows:

614 /wstop:TopicSpace/@name

615 The name of the TopicSpace associated with the WS-ServiceGroup XML namespace
616 MUST be “ServiceGroupTopicSpace”.

617 /wstop:Topic

618 This topic is associated with notification messages when a ServiceGroupEntries are added
619 or removed from a ServiceGroup. A Web service that supports the message exchanges
620 associated with the NotificationProducer role as specified in WS-BaseNotification and that
621 wishes to support subscriptions and notifications related to ServiceGroup modifications
622 SHOULD include this topic in its list of supported topics. When a ServiceGroup detects that
623 the contents of the group have been modified, it SHOULD create a notification message
624 artifact recording the situation and, if the message artifact is generated, it MUST associate
625 this notification message with this topic. Note: there are many circumstances in which a
626 modification of a ServiceGroup does not result in the generation of a notification message.

627 /wstop:Topic/@name

628 The name of the Topic representing ServiceGroup modifications MUST be named
629 “ServiceGroupModification”. The namespace property of this topic MUST be the WS-
630 ServiceGroup XML namespace (<http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-1.2-draft-04.xsd>).

632 /wstop:Topic/wstop:MessagePattern

633 This topic is associated with messages that MUST contain an wsrf-
634 sg:EntryAdditionNotification element or an wsrf-sg:EntryRemovalNotification element.
635 These elements and their corresponding complexTypes are described later in this section.

636 8.1 EntryAdditionNotification Message

637 The wsrf-sg:EntryAdditionNotification element is a form of notification message associated with the
638 wsrf-sg:ServiceGroupModification topic. This element is defined as follows:

```
639 <wsrf-sg:EntryAdditionNotification>
640   <wsrf-sg:ServiceGroupEntryEPR>
641     wsa:EndpointReferenceType
642   </wsrf-sg:ServiceGroupEntryEPR>
643   <wsrf-sg:MemberServiceEPR>
644     wsa:EndpointReference
645   </wsrf-sg:MemberServiceEPR>
646   <wsrf-sg:Content>{any}</wsrf-sg:Content>?
647 </wsrf-sg:EntryAddtionNotification>
```

648 The form of the EntryAdditionNotification is further constrained as follows:

649 /wsrf-sg:EntryAdditionNotification

650 One EntryAdditionNotification element is created for each ServiceGroupEntry addition
651 situation detected by the service associated with ServiceGroup resource. This artifact
652 records the addition of an entry to the ServiceGroup.

653 /wsrf-sg:EntryAdditionNotification/ServiceGroupEntryEPR
654 This element MUST contain the EndpointReference of the ServiceGroupEntry that was
655 added to the ServiceGroup.
656 /wsrf-sg:EntryAdditionNotification/MemberServiceEPR
657 This element MUST contain the EndpointReference of the member service that the WS-
658 Resource referenced by @ServiceGroupEntryEPR contains in its MemberEPR resource
659 property.
660 /wsrf-sg:EntryAdditionNotification/Content
661 If this optional element is present, it MUST contain a copy of the Contents resource
662 property element of the ServiceGroupEntry referenced by @ServiceGroupEntryEPR.

8.2 EntryRemovalNotification Message

The wsrf-sg:EntryRemovalNotification element is a form of notification message associated with the wsrf-sg:ServiceGroupModification topic. This element is defined as follows:

```
<wsrf-sg:EntryRemovalNotification>
  <wsrf-sg:ServiceGroupEntryEPR>
    wsa:EndpointReferenceType
  </wsrf-sg:ServiceGroupEntryEPR>
  <wsrf-sg:MemberServiceEPR>
    wsa:EndpointReferenceType
  </wsrf-sg:MemberServiceEPR>
  <wsrf-sg:Content>{any}</wsrf-sg:Content>?
  <wsrf-sg:Reason>xsd:string</wsrf-sg:Reason>?
</wsrf-sg:EntryRemovalNotification>
```

The form of the EntryRemovalNotification is further constrained as follows:

/wsrf-sg:EntryRemovalNotification
One EntryRemovalNotification element is created for each ServiceGroupEntry removal situation detected by the service associated with ServiceGroup resource. This artifact records the removal of an entry to the ServiceGroup.
/wsrf-sg:EntryRemovalNotification/ServiceGroupEntryEPR
This element MUST contain the EndpointReference of the ServiceGroupEntry that was removed to the ServiceGroup. Note: The EndpointReference for the ServiceGroupEntry will not be a valid reference since the removal mechanism from a ServiceGroup is removal of the ServiceGroupEntry.
/wsrf-sg:EntryRemovalNotification/MemberServiceEPR
This element MUST contain the EndpointReference of the member service that the WS-Resource referenced by @serviceGroupEntryEPR contains in its MemberEPR resource property.

- 690 /wsrf-sg:EntryRemovalNotification/Content
691 If this optional element is present, it MUST contain a copy, from some point prior to the
692 removal, of the Contents resource property element of the ServiceGroupEntry referenced
693 by @ServiceGroupEntryEPR.
- 694 /wsrf-sg:EntryRemovalNotification/Reason
695 If this optional element is present it will contain human readable text regarding the reason
696 for the removal for the ServiceGroup.

697 **9 Security Model**

698 In the context of this specification, there are two categories of security aspects that need to be
699 considered: (a) securing the message exchanges and (b) securing the resource properties.

700 **9.1 Securing the message exchanges**

701 When messages exchanges occur between a requestor and a Web service in order to access or
702 act on one or more resource properties, it is RECOMMENDED that the communication between
703 services be secured using the mechanisms described in WS-Security. In order to properly secure
704 messages, the message body and all relevant headers need to be included in the digital signature
705 so as to prove the integrity of the message. In addition, the ReferenceProperties from an
706 EndpointReference, used as part of any message exchange, may be encrypted to ensure their
707 privacy. In the event that a requestor communicates frequently with a Web service to access
708 resource properties, either directly through a query or accomplished through notification of state
709 change, it is RECOMMENDED that a security context be established using mechanisms like those
710 described in WS-Trust [**WS-Trust**] and WS-SecureConversation [**WS-SecureConversation**]
711 allowing for potentially more efficient means of authentication.

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

- 717 • Attaching a nonce to each message and using it in a derived key function with the shared
718 secret
- 719 • Using a derived key sequence and switch "generations"
- 720 • Closing and re-establishing a security context
- 721 • Exchanging new secrets between the parties

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

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

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

- 732 • **Message alteration** – Alteration is prevented by including signatures of the message
733 information using WS-Security.
- 734 • **Message disclosure** – Confidentiality is preserved by encrypting sensitive data using WS-
735 Security.
- 736 • **Key integrity** – Key integrity is maintained by using the strongest algorithms possible (by
737 comparing secured policies – see WS-Policy [**WS-Policy**] and WS-SecurityPolicy [**WS-**
738 **SecurityPolicy**]).
- 739 • **Authentication** – Authentication is established using the mechanisms described in WS-
740 Security and WS-Trust. Each message is authenticated using the mechanisms described in
741 WS-Security.
- 742 • **Accountability** – Accountability is a function of the type of and string of the key and algorithms
743 being used. In many cases, a strong symmetric key provides sufficient accountability. However,
744 in some environments, strong PKI signatures are required.
- 745 • **Availability** – Many services are subject to a variety of availability attacks. Replay is a common
746 attack and it is RECOMMENDED that this be addressed as described in the next bullet. Other
747 attacks, such as network-level denial of service attacks are harder to avoid and are outside the
748 scope of this specification. That said, care should be taken to ensure that minimal processing
749 be performed prior to any authenticating sequences.
- 750 • **Replay** – Messages may be replayed for a variety of reasons. To detect and eliminate this
751 attack, mechanisms should be used to identify replayed messages such as the
752 timestamp/nonce outlined in WS-Security and the sequences outlined in WS-
753 ReliableMessaging [**WS-ReliableMessaging**].

754 9.2 Securing the resource properties

755 Given WS-ServiceGroup defines a mechanism to expose properties about its member WS-
756 Resources through its “Content” resource property on ServiceGroupEntry, security considerations
757 specified in WS-ResourceProperties are applicable to ServiceGroupEntry. Therefore, security
758 policies should be established that ensure that only authorized requestors can access the value of
759 a resource property of a member WS-Resource. It should also be noted that the authorization
760 policies on the properties of a WS-Resource accessible through a ServiceGroup should be
761 consistent with the authorization policies that are applicable when those properties are accessed
762 directly from the resource itself. Similarly, the security policies about message exchanges (e.g.,
763 requiring the resource property value to be encrypted when sent in a response) should be
764 equivalent in order to provide the same protection irrespective of the access point.

765 9.2.1 A Note on MembershipContentRules

766 The MembershipContentRules resource property along with Entry resource property provide a
767 mechanism to allow for requestors to query about the members of a service group based on their
768 interface or a resource property that is contained in member Ws-Resource’s resource properties
769 document, as well as the value of a resource property itself. There may need to be privacy

770 considerations with respect to exposing those values. Therefore, authorization policies as well as
771 message protection policies should be consistent between these values retrieved through
772 ServiceGroup, and those values retrieved through the WS-Resource itself. In general, it is not a
773 good practice to form membership rules based on properties whose values are to remain
774 confidential.

775 Appendix A. Acknowledgments

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799 (IBM).

800

801 **10 References**

802 **10.1 Normative**

804	[RFC 2119]	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.
805	[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.
806	[WS-Basic Profile 1.1]	http://www.ws-i.org/Profiles/BasicProfile-1.1.html
807	[WS-Resource]	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-Resource-1.2-draft-02.pdf
808	[WS-Addressing]	http://www.w3.org/Submission/2004/SUBM-ws-addressing-20040810
809	[WS-BaseNotification]	http://docs.oasis-open.org/wsn/2004/06/wsn-WS-BaseNotification-1.2-draft-03.pdf
810	[WS-ResourceLifetime]	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceLifetime-1.2-draft-05.pdf
811	[WS-ResourceProperties]	http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.pdf
812	[WS-Security]	http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-soap-message-security-1.0.pdf
813	[WS-Topics]	http://docs.oasis-open.org/wsn/2004/06/wsn-WS-Topics-1.2-draft-01.pdf
814	[XML-InfoSet]	http://www.w3.org/TR/xml-infoset/
815	[XML-Names]	http://www.w3.org/TR/REC-xml-names/
816	[XPath]	http://www.w3.org/TR/xpath

828 **10.2 Non-Normative**

829	[OGSI 1.0]	Open Grid Services Infrastructure (OGSI) V1.0 http://forge.gridforum.org/projects/ggf-editor/document/draft-ogsi-service-1/en/1
830	[SOAP 1.2]	http://www.w3.org/TR/soap12-part1/
831	[WSDL 2.0]	http://www.w3.org/TR/wsdl12/
832	[WS-AtomicTransaction]	http://www.ibm.com/developerworks/webservices/library/ws-atomtran/

836	[WS-Policy]	http://www.ibm.com/developerworks/library/ws-policy
837	[WS-ReliableMessaging]	http://www.ibm.com/developerworks/webservices/library/ws-rm/
838	[WS-SecureConversation]	http://www.ibm.com/developerworks/library/ws-secon/
839	[WS-SecurityPolicy]	http://www.ibm.com/developerworks/library/ws-secpol/
840	[WS-Trust]	http://www.ibm.com/developerworks/library/specification/ws-trust/
841		

842 Appendix B. XML Schema

843 The XML types and elements used in this specification are included here for convenience. The
844 authoritative version of this schema document is available at <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-1.2-draft-04.xsd>,
845

846 The XML types and elements used in this specification are defined in the following XML Schema

```
847 <?xml version="1.0" encoding="UTF-8"?>
848 <!--
849
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894

895 -->

896 <xsd:schema
897 xmlns="http://www.w3.org/2001/XMLSchema"
898 xmlns:xsd="http://www.w3.org/2001/XMLSchema"
899 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
900 xmlns:wsrf-rp=
901 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
902 ResourceProperties-1.2-draft-06.xsd"
903 xmlns:wsrf-bf=
904 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-BaseFaults-
905 1.2-draft-04.xsd"
906 xmlns:wsrf-sg=
907 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-
908 1.2-draft-04.xsd"
909 xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
910 elementFormDefault="qualified"
911 attributeFormDefault="unqualified"
912 targetNamespace=
913 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-
914 1.2-draft-04.xsd" >
915 <!-- ===== Imports =====-->
916 -->

917

918 <xsd:import
919 namespace="http://schemas.xmlsoap.org/ws/2004/08/addressing"
920 schemaLocation=
921 "http://schemas.xmlsoap.org/ws/2004/08/addressing"

```

922      />
923      <xsd:import
924          namespace="http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
925          ResourceProperties-1.2-draft-06.xsd"
926              schemaLocation="http://docs.oasis-
927              open.org/wsrf/2005/03/wsrf-WS-ResourceProperties-1.2-draft-06.xsd"
928      />
929      <xsd:import namespace=
930          "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-BaseFaults-1.2-
931          draft-04.xsd"
932          schemaLocation=
933          "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-BaseFaults-1.2-
934          draft-04.xsd"
935      />
936
937      <!-- ===== Resource Property Related
938      ===== -->
939      <!-- ===== Resource Properties for ServiceGroup
940      ===== -->
941
942      <xsd:simpleType name="ContentElementsType">
943          <xsd:list itemType="xsd:QName"/>
944      </xsd:simpleType>
945
946      <xsd:element name="MembershipContentRule">
947          <xsd:complexType>
948              <xsd:attribute name="MemberInterface" type="xsd:QName" />
949              <xsd:attribute name="ContentElements"
950                  type="wsrf-sg:ContentElementsType"
951                  use="required"/>
952              <xsd:anyAttribute namespace="#other"
953 processContents="lax"/>
954          </xsd:complexType>
955      </xsd:element>
956
957      <xsd:complexType name="EntryType">
958          <xsd:sequence>
959              <xsd:element name="ServiceGroupEntryEPR"
960                  type="wsa:EndpointReferenceType"
961                  minOccurs="1" maxOccurs="1"
962                  nillable="true" />

```

```

963     <xsd:element name="MemberServiceEPR"
964         type="wsa:EndpointReferenceType"
965         minOccurs="1" maxOccurs="1" />
966     <xsd:element name="Content"
967         type="xsd:anyType"
968         minOccurs="1" maxOccurs="1" />
969     </xsd:sequence>
970     <xsd:anyAttribute namespace="##other" processContents="lax"/>
971 </xsd:complexType>
972
973 <!-- ===== Resource Properties for ServiceGroupEntry
974 ===== -->
975
976     <xsd:element name="Entry"
977         type="wsrf-sg:EntryType" />
978
979     <xsd:element name="Content"
980         type="xsd:anyType" />
981
982     <xsd:element name="MemberEPR"
983         type="wsa:EndpointReferenceType" />
984
985     <xsd:element name="ServiceGroupEPR"
986         type="wsa:EndpointReferenceType" />
987
988 <!-- ===== Resource Property Related
989 ===== -->
990 <!-- ===== Resource Properties for ServiceGroup
991 ===== -->
992     <xsd:element name="ServiceGroupRP">
993         <xsd:complexType>
994             <xsd:sequence>
995                 <xsd:element ref="wsrf-sg:MembershipContentRule"
996                     minOccurs="0" maxOccurs="unbounded" />
997                 <xsd:element ref="wsrf-sg:Entry"
998                     minOccurs="0" maxOccurs="unbounded" />
999             </xsd:sequence>
1000         </xsd:complexType>
1001         <xsd:unique name="UniqueInterfaces">
1002             <xsd:selector
1003                 xpath=". ./wsrf-sg:MembershipContentRule" />

```

```

1004          <xsd:field xpath="@MemberInterface" />
1005      </xsd:unique>
1006  </xsd:element>
1007
1008  <!-- ===== Resource Properties for ServiceGroupEntry
1009  ===== -->
1010      <xsd:element name="ServiceGroupEntryRP">
1011          <xsd:complexType>
1012              <xsd:sequence>
1013                  <xsd:element ref="wsrf-sg:ServiceGroupEPR"
1014                      minOccurs="1" maxOccurs="1" />
1015                  <xsd:element ref="wsrf-sg:MemberEPR"
1016                      minOccurs="1" maxOccurs="1" />
1017                  <xsd:element ref="wsrf-sg:Content"
1018                      minOccurs="1" maxOccurs="1" />
1019              </xsd:sequence>
1020          </xsd:complexType>
1021      </xsd:element>
1022
1023  <!-- ===== Message Specific Types
1024  ===== -->
1025  <!-- ===== Message Types for ServiceGroupRegistration
1026  ===== -->
1027      <xsd:element name="Add">
1028          <xsd:complexType>
1029              <xsd:sequence>
1030                  <xsd:element name="MemberEPR"
1031                      type="wsa:EndpointReferenceType" />
1032                  <xsd:element name="Content"
1033                      type="xsd:anyType" />
1034                  <xsd:element name="InitialTerminationTime"
1035                      type="xsd:dateTime"
1036                      minOccurs="0" maxOccurs="1" />
1037              </xsd:sequence>
1038          </xsd:complexType>
1039      </xsd:element>
1040
1041      <xsd:element name="AddResponse"
1042                      type="wsa:EndpointReferenceType" />
1043
1044      <xsd:complexType name="ContentCreationFailedFaultType">
```

```

1045         <xsd:complexContent>
1046             <xsd:extension base="wsrf-bf:BaseFaultType" />
1047         </xsd:complexContent>
1048     </xsd:complexType>
1049     <xsd:element name="ContentCreationFailedFault"
1050                 type="wsrf-
1051 sg:ContentCreationFailedFaultType" />
1052
1053         <xsd:complexType
1054 name="UnsupportedMemberInterfaceFaultType">
1055             <xsd:complexContent>
1056                 <xsd:extension base="wsrf-bf:BaseFaultType" />
1057             </xsd:complexContent>
1058         </xsd:complexType>
1059         <xsd:element name="UnsupportedMemberInterfaceFault"
1060                 type="wsrf-
1061 sg:UnsupportedMemberInterfaceFaultType" />
1062
1063         <xsd:complexType name="AddRefusedFaultType">
1064             <xsd:complexContent>
1065                 <xsd:extension base="wsrf-bf:BaseFaultType" />
1066             </xsd:complexContent>
1067         </xsd:complexType>
1068         <xsd:element name="AddRefusedFault"
1069                 type="wsrf-sg:AddRefusedFaultType" />
1070
1071 <!-- = Messages Related to ServiceGroup Change Notification
1072 ===== -->
1073         <xsd:complexType
1074 name="ServiceGroupModificationNotificationType">
1075             <xsd:sequence>
1076                 <xsd:element name="ServiceGroupEntryEPR"
1077                         type="wsa:EndpointReferenceType"
1078                         minOccurs="1" maxOccurs="1"
1079                         nillable="true"/>
1080                 <xsd:element name="MemberServiceEPR"
1081                         type="wsa:EndpointReferenceType"
1082                         minOccurs="1" maxOccurs="1"/>
1083                 <xsd:element name="Content"
1084                         type="xsd:anyType"
1085                         minOccurs="0" maxOccurs="1" />

```

```
1086     </xsd:sequence>
1087   </xsd:complexType>
1088
1089   <xsd:complexType name="ServiceGroupRemovalNotificationType">
1090     <xsd:complexContent>
1091       <xsd:extension
1092         base="wsrf-
1093 sg:ServiceGroupModificationNotificationType">
1094         <xsd:sequence>
1095           <xsd:element name="Reason"
1096             type="xsd:string"
1097             minOccurs="0" maxOccurs="1"/>
1098         </xsd:sequence>
1099       </xsd:extension>
1100     </xsd:complexContent>
1101   </xsd:complexType>
1102
1103   <xsd:element name="EntryAdditionNotification"
1104     type="wsrf-
1105 sg:ServiceGroupModificationNotificationType" />
1106
1107   <xsd:element name="EntryRemovalNotification"
1108     type="wsrf-sg:ServiceGroupRemovalNotificationType"
1109   />
1110
1111 </xsd:schema>
```

1112 **Appendix C. WSDL 1.1**

1113 The WSDL 1.1 for the Web service methods described in this specification is compliant with [WS-
1114 **Basic Profile 1.1**] and is included here for convenience. The authoritative version of this WSDL is
1115 available at <http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-1.2-draft-04.wsdl>,
1116 The following illustrates the WSDL 1.1 for the Web service methods described in this specification:

```
1117 <?xml version="1.0" encoding="utf-8"?>
1118 <!--
1119
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1164

1165 -->
1166

```
1167 <wsdl:definitions name="ServiceGroup"
1168   xmlns="http://schemas.xmlsoap.org/wsdl/"
1169   xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
1170   xmlns:xsd="http://www.w3.org/2001/XMLSchema"
1171   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
1172   xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
1173   xmlns:wsrf-bf=
1174     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-BaseFaults-
1175 1.2-draft-04.xsd"
1176   xmlns:wsrf-rp=
1177     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
1178 ResourceProperties-1.2-draft-06.xsd"
1179   xmlns:wsrf-rpw=
1180     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
1181 ResourceProperties-1.2-draft-06.wsdl"
1182   xmlns:wsrf-rl=
1183     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
1184 ResourceLifetime-1.2-draft-05.xsd"
1185   xmlns:wsrf-rw=
1186     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-Resource-1.2-
1187 draft-03.wsdl"
1188   xmlns:wsrf-sg=
1189     "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-
1190 1.2-draft-04.xsd"
```

```

1191     xmlns:wsrf-sgw=
1192         "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-
1193 1.2-draft-04.wsdl"
1194     targetNamespace=
1195         "http://docs.oasis-open.org/wsrf/2005/04/wsrf-WS-ServiceGroup-
1196 1.2-draft-04.wsdl">
1197
1198     <!-- ===== Imports
1199     ===== -->
1200     <wsdl:import namespace=
1201 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
1202 ResourceProperties-1.2-draft-06.wsdl"
1203     location=
1204 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
1205 ResourceProperties-1.2-draft-06.wsdl" />
1206
1207     <wsdl:import namespace=
1208 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceLifetime-
1209 1.2-draft-05.wsdl"
1210     location=
1211 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ResourceLifetime-
1212 1.2-draft-05.wsdl" />
1213
1214     <wsdl:import namespace=
1215 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-Resource-1.2-
1216 draft-03.wsdl"
1217     location=
1218 "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-Resource-1.2-
1219 draft-03.wsdl" />
1220
1221     <xsd:import namespace=
1222 "http://schemas.xmlsoap.org/ws/2004/08/addressing"
1223     schemaLocation=
1224 "http://schemas.xmlsoap.org/ws/2004/08/addressing"
1225     />
1226
1227     <!-- ===== Types Definitions
1228     ===== -->
1229     <wsdl:types>
1230         <xsd:schema
1231             xmlns:xsd="http://www.w3.org/2001/XMLSchema"

```

```

1232         targetNamespace=
1233             "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
1234 ServiceGroup-1.2-draft-04.xsd"
1235             elementFormDefault="qualified"
1236             attributeFormDefault="unqualified">
1237
1238         <xsd:import namespace=
1239             "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-
1240 1.2-draft-04.xsd"
1241             schemaLocation=
1242             "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-ServiceGroup-
1243 1.2-draft-04.xsd"
1244         />
1245
1246         <xsd:import namespace=
1247             "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
1248 ResourceLifetime-1.2-draft-05.xsd"
1249             schemaLocation=
1250             "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
1251 ResourceLifetime-1.2-draft-05.xsd"
1252         />
1253
1254         <xsd:import namespace=
1255             "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
1256 ResourceProperties-1.2-draft-06.xsd"
1257             schemaLocation=
1258             "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-
1259 ResourceProperties-1.2-draft-06.xsd"
1260         />
1261
1262         <xsd:import namespace=
1263             "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-BaseFaults-1.2-
1264 draft-04.xsd"
1265             schemaLocation=
1266             "http://docs.oasis-open.org/wsrf/2005/03/wsrf-WS-BaseFaults-1.2-
1267 draft-04.xsd"
1268         />
1269     </xsd:schema>
1270   </wsdl:types>
1271
1272 <!-- ===== Message Definitions -->

```

```

1273 ===== -->
1274 <!-- ===== ServiceGroupRegistration::Add
1275 =====
1276     Add(MemberEPR, Content, [InitialTerminationTime])
1277     returns: EPR to ServiceGroupEntry
1278 -->
1279     <wsdl:message name="AddRequest">
1280         <wsdl:part name="AddRequest" element="wsrf-sg:Add" />
1281     </wsdl:message>
1282
1283     <wsdl:message name="AddResponse">
1284         <wsdl:part name="AddResponse" element="wsrf-sg:AddResponse" />
1285     </wsdl:message>
1286
1287     <wsdl:message name="ContentCreationFailedFault">
1288         <wsdl:part name="ContentCreationFailedFault"
1289             element="wsrf-sg:ContentCreationFailedFault" />
1290     </wsdl:message>
1291
1292     <wsdl:message name="UnsupportedMemberInterfaceFault">
1293         <wsdl:part name="UnsupportedMemberInterfaceFault"
1294             element="wsrf-sg:UnsupportedMemberInterfaceFault"
1295         />
1296     </wsdl:message>
1297
1298     <wsdl:message name="AddRefusedFault">
1299         <wsdl:part name="AddRefusedFault"
1300             element="wsrf-sg:AddRefusedFault" />
1301     </wsdl:message>
1302
1303 <!-- ===== PortType Definitions
1304 ===== -->
1305     <wsdl:portType name="ServiceGroup"
1306         wsrf-rp:ResourceProperties="wsrf-sg:ServiceGroupRP">
1307         <wsdl:operation name="GetResourceProperty">
1308             <wsdl:input name="GetResourcePropertyRequest"
1309                 message="wsrf-rpw:GetResourcePropertyRequest" />
1310             <wsdl:output name="GetResourcePropertyResponse"
1311                 message="wsrf-rpw:GetResourcePropertyResponse" />
1312             <wsdl:fault name="InvalidResourcePropertyQNameFault"
1313                 message="wsrf-rpw:InvalidResourcePropertyQNameFault"
1314         />

```

```

1315     <wsdl:fault name="ResourceUnknownFault"
1316         message="wsrf-rw:ResourceUnknownFault" />
1317
1318     </wsdl:operation>
1319 </wsdl:portType>
1320
1321     <wsdl:portType name="ServiceGroupEntry"
1322         wsrf-rp:ResourceProperties="wsrf-
1323 sg:ServiceGroupEntryRP">
1324         <wsdl:operation name="GetResourceProperty">
1325             <wsdl:input name="GetResourcePropertyRequest"
1326                 message="wsrf-rpw:GetResourcePropertyRequest" />
1327             <wsdl:output name="GetResourcePropertyResponse"
1328                 message="wsrf-rpw:GetResourcePropertyResponse"
1329         />
1330         <wsdl:fault name="InvalidResourcePropertyQNameFault"
1331             message="wsrf-
1332 rpw:InvalidResourcePropertyQNameFault" />
1333         <wsdl:fault name="ResourceUnknownFault"
1334             message="wsrf-rw:ResourceUnknownFault" />
1335         </wsdl:operation>
1336     </wsdl:portType>
1337
1338     <wsdl:portType name="ServiceGroupRegistration"
1339         wsrf-rp:ResourceProperties="wsrf-
1340 sg:ServiceGroupRP">
1341         <wsdl:operation name="GetResourceProperty">
1342             <wsdl:input name="GetResourcePropertyRequest"
1343                 message="wsrf-rpw:GetResourcePropertyRequest" />
1344             <wsdl:output name="GetResourcePropertyResponse"
1345                 message="wsrf-rpw:GetResourcePropertyResponse"
1346         />
1347         <wsdl:fault name="InvalidResourcePropertyQNameFault"
1348             message="wsrf-
1349 rpw:InvalidResourcePropertyQNameFault" />
1350         <wsdl:fault name="ResourceUnknownFault"
1351             message="wsrf-rw:ResourceUnknownFault" />
1352         </wsdl:operation>
1353         <wsdl:operation name="Add">
1354             <wsdl:input name="AddRequest" message="wsrf-
1355 sgw:AddRequest" />

```

```
1356     <wsdl:output name="AddResponse" message="wsrf-
1357     sgw:AddResponse" />
1358         <wsdl:fault name="ContentCreationFailedFault"
1359             message="wsrf-sgw:ContentCreationFailedFault" />
1360         <wsdl:fault name="UnsupportedMemberInterfaceFault"
1361             message="wsrf-
1362 sgw:UnsupportedMemberInterfaceFault" />
1363         <wsdl:fault name="AddRefusedFault"
1364             message="wsrf-sgw:AddRefusedFault" />
1365         <wsdl:fault name="ResourceUnknownFault"
1366             message="wsrf-rw:ResourceUnknownFault" />
1367     </wsdl:operation>
1368 </wsdl:portType>
1369
1370 </wsdl:definitions>
```

Appendix D. Revision History

Rev	Date	By Whom	What
wd-01	2004-06-05	Tom Maguire	Initial version created from submission by contributing companies. Minor modifications made to reflect OASIS formatting.
wd-02	2004-06-07	Tom Maguire	Updated to include elementFormDefault and attributeFormDefault. Changed URI from 2004/05 to 2004/06. Updated acknowledgements section.
wd-02	2004-06-11	Ian Robinson	Consistency edit for status, acknowledgements and references sections.
wd-03	2004-11-10	Tom Maguire	Issue resolutions from October F2F: <ul style="list-style-type: none"> o WSRF30, WSRF43, WSRF49, WSRF53, WSRF56 o Replaced refs to [State Paper] o Update to use "WS-Resource Access Pattern" o Changed doc identifier to "Summary Info Title" o Added missing wsdl:import for WS-Addressing in wsdl o Fixed selector for "UniqueInterfaces" in wsdl (WSRF60 & WSRF70) o Fixed namespace prefix errors in wsdl o Fixed namespace prefix errors in SOAP examples o Updated UML diagram o Removed erroneous wsa:to in AddResponse example
wd-04	2005-02-18	Tom Maguire	Corrected concrete message element

Rev	Date	By Whom	What
			<p>namespaces.</p> <p>Updated OASIS copyright to 2005.</p> <p>Issue resolutions from February F2F:</p> <ul style="list-style-type: none"> ○ Updated namespace declarations to latest 2005/03 ○ WSRF62 Basic profile 1.1 statement ○ WSRF96 Statement specifying the authoritative versions of wsdl and xsd ○ WSRF63 add attribute extensibility ○ WSRF86 add ResourceUnknown fault to all operations ○ WSRF81 remove xsd:include in favor of xsd:import. Move all schema definitions to xsd.

1372

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