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# Web Services Service Group 1.2 (WS-ServiceGroup)

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**Abstract:**
   A ServiceGroup is a heterogeneous by-reference collection of Web services.
   ServiceGroups can be used to form a wide variety of collections of services or WS-
   Resources [State Paper], including registries of services and associated WS-Resources.

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

**Status:**
   This document and associated schema are published by this TC as "working drafts" and
   represent the starting point for our standardization process. It is possible that they may
   change significantly during this process, but should nonetheless provide a stable reference
   for discussion and early adopters' implementations.

   Committee members should send comments on this specification to the wsrf@lists.oasis-
   open.org list. Others should subscribe to and send comments to the wsrf-

32      comment@lists.oasis-open.org list. To subscribe, send an email message to wsrf-
33      comment-request@lists.oasis-open.org with the word "subscribe" as the body of the
34      message.

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

39

# Table of Contents

# 79  1  Introduction

80  In this document, we consider a distributed computing environment consisting of Web services and
81  stateful resources. A pattern defining the relationship between Web services and stateful resources
82  is detailed in "Modeling Stateful Resources with Web services" [State Paper]. The term WS-
83  Resource is used to describe the relationship between a Web service and a stateful 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]. Groups
92  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].

## 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 implied resource pattern [State Paper].

### 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.

## 1.2  Notational Conventions

118

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 When describing concrete XML schemas, this specification uses the notational convention of [WS-
126 Security]. Specifically, each member of an element's [children] or [attributes] property is described
127 using an XPath-like notation (e.g., /x:MyHeader/x:SomeProperty/@value1). The use of {any}
128 indicates the presence of an element wildcard (<xsd:any/>). The use of @{any} indicates the
129 presence of an attribute wildcard (<xsd:anyAttribute/>).

## 1.3  Namespaces

130

131 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 |
| wsp | http://schemas.xmlsoap.org/ws/2002/12/policy |
| wsa | http://schemas.xmlsoap.org/ws/2003/02/addressing |
| wsbf | http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-BaseFaults-1.2-draft-01.xsd |
| wsrp | http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceProperties-1.2-draft-01.xsd |
| wsrpw | http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceProperties-1.2-draft-01.wsdl |
| wsrl | http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft-01.xsd |
| wsnt | http://docs.oasis-open.org/wsrf/2004/06/wsn-WS-BaseNotification-1.2-draft-01.xsd |
| wssg | http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ServiceGroup-1.2-draft-01.xsd |
| wssgw | http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ServiceGroup-1.2-draft-01.wsdl |
| wstop | http://docs.oasis-open.org/wsn/2004/06/wsn-WS-Topics-1.2-draft-01.xsd |

## 132  2 Example

133 As an example of using a service group, let's consider a group containing services that one has
134 accessed recently.  In effect, this is a Web services equivalent of a Web browser's "history" feature.
135 The services that have been accessed can implement any interface.  They could be simple Web
136 services or Web services that are part of a WS-Resource, so they can have resource properties or
137 not.
138
139 The only constraint the group has on its members is that the membership information of the
140 members contains the date of last interaction with the service and whether the outcome or this
141 interaction was successful or not. This constraint is exposed by the following membership rule:

```
142    …
143    <MembershipContentRule
144      ContentElements="ns1:DateOfLastInvoke ns1:Outcome"/>
145    …
```

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

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

```
154    …
155    <wssg:MembershipContentRule
156      ContentElements="ns1:DateOfLastInvoke ns1:Outcome"/>
157
158    <wssg:MembershipContentRule
159        MemberInterface="ns2:CatalogPortType"
160        ContentElements=""/>
161
162    <wssg:MembershipContentRule
163        MemberInterface="ns3:PurchasePortType"
164        ContentElements="ns3:PurchaseAmount"/>
165    …
```

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

```
169    …
170    <wssg:Content>
171      <ns1:DateOfLastInvoke>xsd:dateTime</ns1:DateOfLastInvoke>
```

```
172      <ns1:Outcome>xsd:string</ns1:Outcome>
173      <ns3:PurchaseAmount>xsd:nonNegativeInteger</ns3:PurchaseAmount>
174    </wssg:Content>
175      …
```

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

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

# 3  Terminology and Concepts

182

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

185  **Member:**

186  o   A Web service that belongs to a ServiceGroup. Note, this Web service may be a
187      component of a WS-Resource as defined in "Modeling Stateful Resources with Web
188      services" [State Paper].

189  **ServiceGroup:**

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

194  **ServiceGroupEntry:**

195  o   An atomic entry in a ServiceGroup which associates a member to a ServiceGroup. A
196      ServiceGroupEntry also contains content information by which the member's participation
197      in the ServiceGroup is advertised.

198  **ServiceGroupRegistration:**

199  o   A ServiceGroup that provides the means to allow users of the service to explicitly insert
200      new members.

201  **WS-Resource:**

202  o   A Web service having an association with a stateful resource, where the stateful resource
203      is defined by a resource properties document type and the association is expressed by
204      annotating a WSDL portType with the type definition of the resource properties document.

205  **Implied Resource Pattern:**

206  o   The way WS-Addressing must be used to designate the stateful resource component of the
207      WS-Resource to be used in the execution of message exchanges.

208  o   An EndpointReference that follows the implied resource pattern may include a
209      ReferenceProperties child element that identifies the stateful resource component of the
210      WS-Resource to be used in the execution of all message exchanges performed using this
211      EndpointReference.

212  o   A message that follows the implied resource pattern MUST be sent to a Web service
213      referred to by an EndpointReference that follows the implied resource pattern, and MUST
214      conform to the WS-Addressing requirements on that message including adding the
215      ReferenceProperties information, if present, from that EndpointReference to the message.

216  o   A Web service that follows the implied resource pattern MAY use the ReferenceProperties
217      information from a message that follows the implied resource pattern in order to identify the
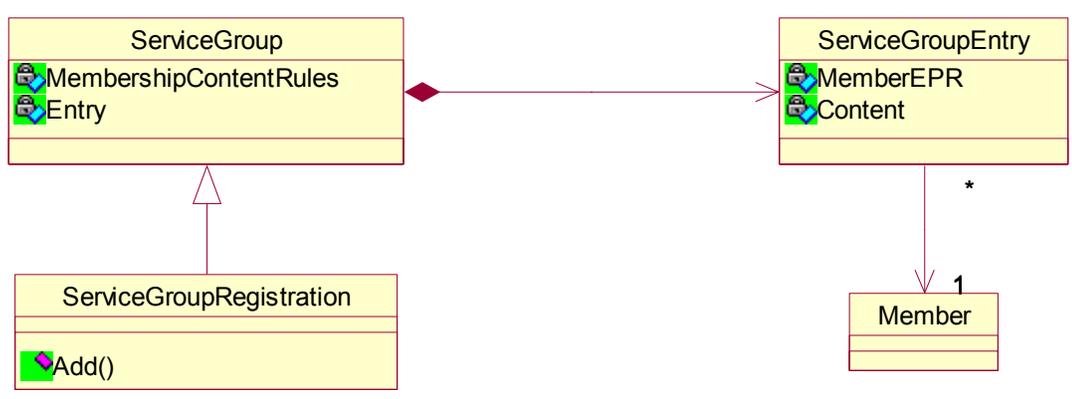218      stateful resource to be used in the execution requested by that message.

219  **WS-Resource Qualified Endpoint Reference:**

220    o   An Endpoint Reference used to refer to a WS-Resource composed of a Web service and a
221        stateful resource.
222    o   A stateful resource identifier MAY be contained within the ReferenceProperties element of
223        the Endpoint Reference.
224    o   The address of the Web service associated with the WS-Resource MUST be contained in
225        the Address element of the Endpoint Reference.

226  **Resource Property:**

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

## 231   **4  Grouping Services**

232   A ServiceGroup maintains information about a collection of Web services. Each of the Web
233   services represented in the collection may be a component of a WS-Resource. These Web
234   services may be members of a ServiceGroup for a specific reason, such as being part of a
235   federated service, or they may have no specific relationship, such as the Web services contained in
236   an index or registry operated for Web service discovery purposes.

237   Three sets of message exchanges provide the interface to service groups ServiceGroup,
238   ServiceGroupEntry and ServiceGroupRegistration. The member interface is not a part of the WS-
239   ServiceGroup specification but is included for completeness. The depiction below details the
240   interfaces relevant to ServiceGroups.



241

# 242  5 ServiceGroup

243 A ServiceGroup is a WS-Resource, following the implied resource pattern [State Paper], which
244 represents a collection of other Web services. The individual services represented within the
245 ServiceGroup are the ServiceGroup's members, or its membership. The model for membership of a
246 ServiceGroup is an *entry* WS-Resource. An entry WS-Resource represents an association with a
247 given member in the ServiceGroup. Additionally a ServiceGroup has the following characteristics:

248    o   When a ServiceGroup WS-Resource is destroyed, all of the ServiceGroupEntry WS-
249        Resources, modeling the membership of the ServiceGroup, are also RECOMMENDED to
250        be destroyed. Note however, that the actual member Web services or WS-Resources are
251        not affected.
252    o   Once a ServiceGroup is destroyed, a requestor MUST make no assumptions about either
253        the existence of the entry WS-Resources that represent the ServiceGroup membership or
254        the validity of the contents of those WS-Resources.
255    o   A member MAY belong to several ServiceGroups.
256    o   A member MAY belong to the same ServiceGroup more then once.
257    o   The member of a ServiceGroup MAY implement message exchanges from various
258        interfaces.
259    o   If a member WS-Resource is destroyed, the ServiceGroup MAY destroy the corresponding
260        entry WS-Resource that represents the membership of that WS-Resource in the
261        ServiceGroup.
262    o   The grouping and membership aspects of a ServiceGroup are only manifest in the linkage
263        between a ServiceGroup and a ServiceGroupEntry. Accordingly, a ServiceGroupEntry in
264        isolation has no semantic meaning.

## 265  5.1  ServiceGroup ResourceProperties

266 In addition to the message exchanges described in this specification, a ServiceGroup MUST also
267 support the required message exchanges defined in the WS-ResourceProperties specification and
268 MAY support the optional message exchanges defined in the WS-ResourceProperties
269 specification. The resource property document defined by the ServiceGroup MUST include the
270 following resource property elements.

### 271  5.1.1  MembershipContentRule Resource Property

272 The resource property document contains a potentially empty set of MembershipContentRule
273 elements that specify the intensional constraints on *membership* of the *service group*. That is,
274 membership can be restricted to members that implement a particular interface and/or it can
275 require the presence of particular child elements in the wssg:Content resource property of the
276 ServiceGroupEntry representing the membership in the group.

277 The ServiceGroup resource property document MAY contain zero MembershipContentRule child
278 elements. When no MembershipContentRule elements are specified, the members of the
279 ServiceGroup are unconstrained. When the ServiceGroup is unconstrained any member MAY be
280 present in the ServiceGroup.

281    When at least one MembershipContentRule element specification exists, the members of the
282    ServiceGroup are constrained.  When the ServiceGroup is constrained, the ServiceGroup MUST
283    NOT include a member that does not conform to at least one MembershipContentRule element.  If
284    more than one rule applies to a given member all rules that apply MUST be satisfied.  Membership
285    conformance to an individual MembershiptContentRule is described below in the
286    MembershipContentRule component constraints.

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

```
288    <wssg:MembershipContentRule
289        MemberInterface="QName"?
290        ContentElements="list of QName"
291    />
```

292    (see Appendix I: MembershipContentRule element definition & Appendix II: ServiceGroup resource
293    property)

294    This resource property element is further constrained as follows:

295    /wssg:MembershipContentRule

296            The MembershipContentRule constrains the ServiceGroup membership to those members
297            that implement the interface described below in
298            /wssg:membershipContentRule/@MemberInterface if present. A MembershipContentRule
299            is further satisfied according to the rules defined below in
300            wssg:membershipContentRule/@ContentElements.

301    /wssg:membershipContentRule/@MemberInterface

302            This optional attribute, when present, specifies the members to which this
303            MembershipConentRule applies according to the interface (WSDL 1.1 portType) of the
304            member Web service.  For MembershipContentRules where @MemberInterface is
305            specified, there MUST be at most one MembershipContentRule for any given value of
306            @MemberInterface.

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

312    /wssg:membershipContentRule/@ContentElements

313            This attribute specifies the content restrictions according to the list of QNames, each of
314            which refer to a XML Schema global element declaration.  This list defines the constraints
315            on the wssg:Content resource property of the ServiceGroupEntry that MUST be satisfied
316            for membership.  The list MAY be an empty list.  When an empty list is specified there are
317            no content constraints on the resource properties of the ServiceGroupEntries that match
318            the enclosing MembershipContentRule.

319            A member satisfies a MembershipContentRule if, for each QName in the value of
320            @ContentElements, there is at least one child element of the wssg:Content of the
321            ServiceGroupEntry's resource properties document whose name matches that QName.

322 Two QNames are equivalent when they have the same local part and they have prefixes
323 which have been bound to namespace names that are identical [XML-Names].

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

## 5.1.2 Entry Resource Property

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

```
330     <wssg:Entry>
331        <wssg:ServiceGroupEntryEPR>
332          wsa:EndpointReferenceType
333        </wssg:ServiceGroupEntryEPR>
334        <wssg:MemberServiceEPR>
335          wsa:EndpointReferenceType
336        </wssg:MemberServiceEPR>
337        <wssg:Content> {any} </wssg:Content> ?
338     </wssg:Entry>
```

339 (see Appendix I: Entry type and element definition & Appendix II: ServiceGroup resource property)

340 This resource property element is further constrained as follows

341 /wssg:Entry

342 The entry provides the logical structure of the constituent members of the ServiceGroup.
343 There is one entry element for each entry in the ServiceGroup. In the event of an entry's
344 removal or destruction from a ServiceGroup, the corresponding element in the
345 ServiceGroup's resource property MUST also be removed. The removal of the element
346 from the ServiceGroup's resource property SHOULD occur temporally near the removal or
347 destruction of the entry.

348 /wssg:Entry/ServiceGroupEntryEPR

349 Endpoint reference as defined in [WS-Addressing] to the ServiceGroupEntry WS-Resource
350 with which the entry is associated.  This WS-Resource is the representation of the
351 membership of the member in the group.  Existence of this WS-Resource is the definitive
352 test that the member is indeed part of the group.  If the WS-Resource referenced by
353 ServiceGroupEntryEPR is not available, the consumer MUST NOT assume that the Web
354 service referenced
355 by the @MemberServiceEPR is a member of the service group.

356 /wssg:Entry/MemberServiceEPR

357 Endpoint reference as defined in [WS-Addressing] to the member to which the entry refers.

358 /wssg:Entry/Content

359 The optional Content element contains the resource property values that conform to the
360 wssg:MembershipContentRule/@ContentElements of the ServiceGroup. In the absence of
361 concurrency controls a requestor MUST NOT assume that this element will be identical to
362 the element that the WS-Resource, referenced by @ServiceGroupEntryEPR, contains in its
363 wssg:Content resource property.  In the case that wssg:Entry/Content is not identical to the

364        wssg:Content resource property of the WS-Resource referenced by the
365        @ServiceGroupEntryEPR then the wssg:Content is assumed to be authoritative.  (For
366        further discussion reference "WS-Resource and ACID Properties" [State Paper])

## 367  5.2  ServiceGroup: Operations

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

# 371 6 ServiceGroupEntry

372 The representation of a member Web service within the ServiceGroup is a WS-Resource. The
373 Web service component of this WS-Resource implements the ServiceGroupEntry interface. The
374 ServiceGroupEntry interface describes the requirements on the Web service through which
375 management of the entry occurs.

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

379 A ServiceGroupEntry interface MAY provide additional management functions for a
380 ServiceGroupEntry WS-Resource. In particular, it MAY provide independent lifetime management
381 functions for individual ServiceGroupEntry WS-Resources (if it implements message exchanges
382 defined in WS-ResourceLifetime). In the case where the ServiceGroupEntry Web service
383 implements one of the message exchange sets defined in WS-ResourceLifetime, a
384 ServiceGroupEntry WS-Resource MAY be removed from a ServiceGroup by managing the lifetime
385 of the ServiceGroupEntry WS-Resource. Additional message exchanges MAY be defined to
386 provide more advanced ServiceGroupEntry capabilities.

## 387 6.1 ServiceGroupEntry: Resource Property Declarations

388 In addition to the message exchanges described in this specification, a ServiceGroupEntry MUST
389 also support the required message exchanges defined in the WS-ResourceProperties specification
390 and MAY support the optional message exchanges defined in the WS-ResourceProperties
391 specification.

### 392 6.1.1 ServiceGroupEPR

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

```
394     <wssg:ServiceGroupEPR>
395       wsa:EndpointReferenceType
396     </wssg:ServiceGroupEPR>
```

397 (see Appendix I: ServiceGroupEPR element definition & Appendix II: ServiceGroupEntry resource
398 property)

399 This resource property element is further constrained as follows:

400 /wssg:ServiceGroupEPR

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

### 404 6.1.2 MemberEPR

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

```
406     <wssg:MemberEPR>
407       wsa:EndpointReferenceType
408     </wssg:MemberEPR>
```

409 (see <u>Appendix I: MemberEPR element definition</u> & <u>Appendix II: ServiceGroupEntry resource</u>
410 <u>property</u>)

411 This resource property element is further constrained as follows:

412 /wssg:MemberEPR

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

### 6.1.3 Content

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

```
418   <wssg:Content>
419     {any}
420   </wssg:Content>
```

421 (see <u>Appendix I: Content element definition</u> & <u>Appendix II: ServiceGroupEntry resource property</u>)

422 This resource property element is further constrained as follows:

423 /wssg:Content

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

## 6.2 ServiceGroupEntry: Message Exchanges

429 The ServiceGroupEntry interface defines no operations. The service implementing the
430 ServiceGroupEntry interface SHOULD implement the message exchanges and resource properties
431 from one of the interfaces described in WS-ResourceLifetime if it supports immediate destruction
432 and scheduled destruction of ServiceGroupEntry resources. In addition, the service implementing
433 the ServiceGroupEntry interface SHOULD implement the message exchanges and resource
434 properties for the NotificationProducer interface [WS-BaseNotification]. The service implementing
435 the ServiceGroupEntry SHOULD also support resource property value change notification as
436 defined in [WS-ResourceProperties]. In particular, it SHOULD include wssg:Content as a value of
437 its Topics resource property.

# 7 ServiceGroupRegistration

438

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

## 7.1 ServiceGroupRegistration: Resource Property Declarations

443

444 The ServiceGroupRegistration interface defines no resource properties. The resource properties
445 defined by the interfaces in WS-ResourceLifetime SHOULD be included in the ResourceProperty
446 document of a ServiceGroupRegistration. The resource properties defined in the ServiceGroup
447 interface MUST be included in the resource property document of a ServiceGroupRegistration.

## 7.2 Add

448

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

```
451  <wssg:Add>
452    <wssg:MemberEPR>
453      wsa:EndpointReferenceType
454    </wssg:MemberEPR>
455    <wssg:Content>
456      {any}
457    </wssg:Content>
458    <wssg:InitialTerminationTime>
459      xsd:dateTime
460    </wssg:InitialTerminationTime>?
461  </wssg:Add>
```

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

463 /wssg:Add/MemberEPR

464      This component contains the endpoint reference of the member Web service to include in
465      the ServiceGroup. It MUST satisfy the semantics as specified by the ServiceGroup
466      resource property /wssg:MemberhipContentRules.

467 /wssg:Add/Content

468      This component contains information to associate with the MemberEPR in the
469      ServiceGroup. This component MUST be an element that conforms to those
470      MembershipContentRules that apply to the member within the ServiceGroup. This
471      component represents input for the ServiceGroupEntry content element. This input MAY be
472      augmented or modified with other information that the ServiceGroup may derive. This
473      allows the ServiceGroup to tailor or modify the content.

474 /wssg:Add/InitialTerminationTime

| 475 | An optional element, indicating the requestor's suggestion for the initial setting of the |
| 476 | termination time resource property [WS-ResourceLifetime] of the ServiceGroupEntry WS- |
| 477 | Resource. |
| 478 | If the ServiceGroupRegistration accepts the request to add a member, it MUST respond with an |
| 479 | AddResponse message of the following form: |

```
480    <wssg:AddResponse>
481      wsa:endpointReferenceType
482    </wssg:AddResponse>
```

| 483 | The content of a AddResponse message is an EndpointReference as described in [WS- |
| 484 | Addressing]. This endpoint reference refers to the ServiceGroupEntry WS-Resource created by |
| 485 | the ServiceGroup to represent the association of the member within the ServiceGroup. The Web |
| 486 | service associated with the ServiceGroupEntry returned by the AddResponse MUST implement the |
| 487 | message exchanges and resource properties specified by the ScheduledResourceTermination |
| 488 | interface and the ImmediateResourceTermination interface [WS-ResourceLifetime]. |
| 489 | Instead of the AddResponse message, the Web service may also send the following faults in |
| 490 | response to an Add message. For those faults associated with failure to process an Add message |
| 491 | ContentCreationFailedFault: |
| 492 | The operation was unable to create a valid Content element (as defined by the |
| 493 | membershipContentRule resource property) from the provided Content and MemberEPR |
| 494 | components of the Add request message. |
| 495 | UnsupportedMemberInterfaceFault: |
| 496 | The type of the member service referred to by the MemberEPR argument is not conformant |
| 497 | with the MembershipContentRule. |
| 498 | AddRefusedFault: |
| 499 | The ServiceGroupRegistration refused to create a new entry for the member service based |
| 500 | the semantics of the ServiceGroupRegistration (or subtype). |
| 501 | Other Faults |

## 7.2.1 Example SOAP Encoding of the Add Message Exchange

| 503 | The following is a non-normative example of an Add request message using SOAP 1.2 [SOAP 1.2]: |

```
504    <s12:Envelope
505        xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
506        xmlns:wsa="http://schemas.xmlsoap.org/ws/2003/03/addressing"
507        xmlns:wsnt=
508          "http://docs.oasis-open.org/wsrf/2004/06/wsn-WS-
509    BaseNotification-1.2-draft-01.xsd"
510        xmlns:wsrl=
511          "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
512    ResourceLifetime-1.2-draft-01.xsd"
513        xmlns:wssg=
514          "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
515    ServiceGroup-1.2-draft-01.xsd"
516        xmlns:npex="http://www.producer.org/RefProp">
```

```
517      <s12:Header>
518        <wsa:Action>
519            http://docs.oasis-open.org/wsrf/2004/06/WS-
520      ServiceGroup/Add
521        </wsa:Action>
522        <wsa:To s12:mustUnderstand="1">
523            http://www.producer.org/ServiceGroupEndpoint
524        </wsa:To>
525      </s12:Header>
526      <s12:Body>
527        <wssg:Add>
528          <wssg:MemberEPR>
529            <wsa:Address>
530                http://www.producer.org/ProducerEndpoint
531            </wsa:Address>
532            <wsa:ReferenceProperties>
533              <npex:ResourceDisambiguator>
534                  uuid:84decd55-7d3f-65ad-ac44-675d9fce5d22
535              </npex:ResourceDisambiguator>
536            </wsa:ReferenceProperties>
537          </wssg:MemberEPR>
538          </wssg:Content>
539
540  <wstop:Topic>wsrp:ResourcePropertiesValueChanges</wstop:Topic>
541          <wssg:Content>
542          <wssg:InitialTerminationTime>
543            2003-12-25T00:00:00.00000Z
544          </wssg:InitialTerminationTime>
545        </wssg:Add>
546      </s12:Body>
547    </s12:Envelope>
```

548  The following is a non-normative example of an Add response message using SOAP 1.2 [SOAP
549  1.2]:

```
550    <s12:Envelope
551        xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
552        xmlns:wsa="http://schemas.xmlsoap.org/ws/2003/03/addressing"
553        xmlns:npex="http://www.consumer.org/RefProp">
554        xmlns:wssg=
555          "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
556      ServiceGroup-1.2-draft-01.xsd"
557      <s12:Header>
558        <wsa:Action>
559            http://docs.oasis-open.org/wsrf/2004/06/WS-ServiceGroup/
560      AddResponse
```

```
561        </wsa:Action>
562        <wsa:To s12:mustUnderstand="1">
563            http://www.producer.org/ProducerEndpoint
564        </wsa:To>
565        <npex:ResourceDisambiguator>
566            uuid:84decd55-7d3f-65ad-ac44-675d9fce12ef
567        </npex:ResourceDisambiguator>
568      </s12:Header>
569      <s12:Body>
570        <wssg:AddResponse>
571          <wsa:EndpointReference>
572            <wsa:Address>
573               http://www.producer.org/ServiceGroupEndpoint
574            </wsa:Address>
575            <wsa:ReferenceProperties>
576              <npex:ResourceDisambiguatore>
577                 uuid:95fefeb3-f37d-5dfe-44fe-675d9fce12df
578              </npex:ResourceDisambiguator>
579            </wsa:ReferenceProperties>
580          </wsa:EndpointReference>
581        </wssg:AddResponse>
582      </s12:Body>
583    </s12:Envelope>
```

# 584  8  Notification of ServiceGroup Modification

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

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

616

617  This TopicSpace defines the TopicSpace associated with the WS-ServiceGroup XML namespace
618  (http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ServiceGroup-1.2-draft-01.xsd). The TopicSpace
619  is further constrained as follows:

620  /wstop:TopicSpace/@name

621         The name of the TopicSpace associated with the WS-ServiceGroup XML namespace
622         MUST be "ServiceGroupTopicSpace".

623  /wstop:Topic

| 624 | This topic is associated with notification messages when a ServiceGroupEntries are added |
| 625 | or removed from a ServiceGroup. A Web service that supports the message exchanges |
| 626 | associated with the NotificationProducer role as specified in WS-Notification and that |
| 627 | wishes to support subscriptions and notifications related to ServiceGroup modifications |
| 628 | SHOULD include this topic in its list of supported topics. When a ServiceGroup detects that |
| 629 | the contents of the group have been modified, it SHOULD create a notification message |
| 630 | artifact recording the situation and, if the message artifact is generated, it MUST associate |
| 631 | this notification message with this topic. Note: there are many circumstances in which a |
| 632 | modification of a ServiceGroup does not result in the generation of a notification message. |

633 /wstop:Topic/@name

| 634 | The name of the Topic representing ServiceGroup modifications MUST be named |
| 635 | "ServiceGroupModification". The namespace property of this topic MUST be the WS- |
| 636 | ServiceGroup XML namespace (http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS- |
| 637 | ServiceGroup-1.2-draft-01.xsd). |

638 /wstop:Topic/wstop:MessagePattern

| 639 | This topic is associated with messages that MUST contain an |
| 640 | wssg:EntryAdditionNotification element or an wssg:EntryRemovalNotification element. |
| 641 | These elements and their corresponding complexTypes are described later in this section. |

## 8.1 EntryAdditionNotification Message

| 643 | The wssg:EntryAdditionNotification element is a form of notification message associated with the |
| 644 | wssg:ServiceGroupModification topic.  This element is defined as follows: |

```
645    <wssg:EntryAdditionNotification>
646      <wssg:ServiceGroupEntryEPR>
647        wsa:EndpointReferenceType
648      </wssg:ServiceGroupEntryEPR>
649      <wssg:MemberServiceEPR>
650        wsa:EndpointReference
651      </wssg:MemberServiceEPR>
652      <wssg:Content>{any}</wssg:Content>?
653    </wssg:EntryAddtionNotification>
```

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

655 /wssg:EntryAdditionNotification

| 656 | One EntryAdditionNotification element is created for each ServiceGroupEntry addition |
| 657 | situation detected by the service associated with ServiceGroup resource. This artifact |
| 658 | records the addition of an entry to the ServiceGroup. |

659 /wssg:EntryAdditionNotification/ServiceGroupEntryEPR

| 660 | This element MUST contain the EndpointReference of the ServiceGroupEntry that was |
| 661 | added to the ServiceGroup. |

662 /wssg:EntryAdditionNotification/MemberServiceEPR

663   This element MUST contain the EndpointReference of the member service that the WS-
664   Resource referenced by @ServiceGroupEntryEPR contains in its MemberEPR resource
665   property.

666   /wssg:EntryAdditionNotification/Content

667   If this optional element is present, it MUST contain a copy of the Contents resource
668   property element of the ServiceGroupEntry referenced by @ServiceGroupEntryEPR.

## 8.2   EntryRemovalNotification Message

670   The wssg:EntryRemovalNotification element is a form of notification message associated with the
671   wssg:ServiceGroupModification topic. This element is defined as follows:

```
672   <wssg:EntryRemovalNotification>
673       <wssg:ServiceGroupEntryEPR>
674         wsa:EndpointReferenceType
675       </wssg:ServiceGroupEntryEPR>
676       <wssg:MemberServiceEPR>
677         wsa:EndpointReferenceType
678       </wssg:MemberServiceEPR>
679       <wssg:Content>{any}</wssg:Content>?
680       <wssg:Reason>xsd:string</wssg:Reason>?
681   </wssg:EntryRemovalNotification>
```

682   The form of the EntryRemovalNotification is further constrained as follows:

683   /wssg:EntryRemovalNotification

684   One EntryRemovalNotification element is created for each ServiceGroupEntry removal
685   situation detected by the service associated with ServiceGroup resource. This artifact
686   records the removal of an entry to the ServiceGroup.

687   /wssg:EntryRemovalNotification/ServiceGroupEntryEPR

688   This element MUST contain the EndpointReference of the ServiceGroupEntry that was
689   removed to the ServiceGroup. Note: The EndpointReference for the ServiceGroupEntry will
690   not be a valid reference since the removal mechanism from a ServiceGroup is removal of
691   the ServiceGroupEntry.

692   /wssg:EntryRemovalNotification/MemberServiceEPR

693   This element MUST contain the EndpointReference of the member service that the WS-
694   Resource referenced by @serviceGroupEntryEPR contains in its MemberEPR resource
695   property.

696   /wssg:EntryRemovalNotification/Content

697   If this optional element is present, it MUST contain a copy, from some point prior to the
698   removal, of the Contents resource property element of the ServiceGroupEntry referenced
699   by @ServiceGroupEntryEPR.

700   /wssg:EntryRemovalNotification/Reason

701   If this optional element is present it will contain human readable text regarding the reason
702   for the removal for the ServiceGroup.

# 9  Security Model

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

## 9.1  Securing the message exchanges

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

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

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

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

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

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

- **Message alteration** – Alteration is prevented by including signatures of the message information using WS-Security.
- **Message disclosure** – Confidentiality is preserved by encrypting sensitive data using WS-Security.

742 • **Key integrity** – Key integrity is maintained by using the strongest algorithms possible (by
743 comparing secured policies – see WS-Policy [WS-Policy] and WS-SecurityPolicy [WS-
744 SecurityPolicy]).

745 • **Authentication** – Authentication is established using the mechanisms described in WS-
746 Security and WS-Trust. Each message is authenticated using the mechanisms described in
747 WS-Security.

748 • **Accountability** – Accountability is a function of the type of and string of the key and algorithms
749 being used. In many cases, a strong symmetric key provides sufficient accountability. However,
750 in some environments, strong PKI signatures are required.

751 • **Availability** – Many services are subject to a variety of availability attacks. Replay is a common
752 attack and it is RECOMMENDED that this be addressed as described in the next bullet. Other
753 attacks, such as network-level denial of service attacks are harder to avoid and are outside the
754 scope of this specification. That said, care should be taken to ensure that minimal processing
755 be performed prior to any authenticating sequences.

756 • **Replay** – Messages may be replayed for a variety of reasons. To detect and eliminate this
757 attack, mechanisms should be used to identify replayed messages such as the
758 timestamp/nonce outlined in WS-Security and the sequences outlined in WS-
759 ReliableMessaging [WS-ReliableMessaging].

760 ## 9.2  Securing the resource properties

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

771 ### 9.2.1  A Note on MembershipContentRules

772 The MembershipContentRules resource property along with Entry resource property provide a
773 mechanism to allow for requestors to query about the members of a service group based on their
774 interface or a resource property that is contained in member Ws-Resource's resource properties
775 document, as well as the value of a resource property itself. There may need to be privacy
776 considerations with respect to exposing those values. Therefore, authorization policies as well as
777 message protection policies should be consistent between these values retrieved through
778 ServiceGroup, and those values retrieved through the WS-Resource itself. In general, it is not a
779 good practice to form membership rules based on properties whose values are to remain
780 confidential.

# Appendix A. Acknowledgments

781

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805 (IBM).

806

# 10 References

## 10.1 Normative

**[RFC2119]**      S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*, http://www.ietf.org/rfc/rfc2119.txt, IETF RFC 2119, March 1997.

**[SOAP 1.2]**      http://www.w3.org/TR/soap12-part1/

**[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.

**[State Paper]**      http://www.oasis-open.org/apps/org/workgroup/wsrf/download.php/6795/ws-modelingresources.pdf

**[WS-Addressing]**      http://www.ibm.com/developerworks/webservices/library/ws-add/

**[WS-BaseNotification]**      http://docs.oasis-open.org/wsn/2004/06/wsn-WS-BaseNotification-1.2-draft-03.pdf

**[WS-Policy]**      http://www.ibm.com/developerworks/library/ws-policy

**[WS-ResourceLifetime]**      http://docs.oasis-open.org/wsrf/2004/06/wsrf-ResourceLifetime-1.2.draft-03.pdf

**[WS-ResourceProperties]**      http://docs.oasis-open.org/wsrf/2004/06/wsrf-ResourceProperties-1.2.draft-04.pdf

**[WS-Topics]**      http://www.oasis-open.org/apps/org/workgroup/wsn/download.php/6600/WS-Topics-1-0.pdf

**[XML-Infoset]**      http://www.w3.org/TR/xml-infoset/

**[XML-Names]**      http://www.w3.org/TR/REC-xml-names/

**[XPATH]**      http://www.w3.org/TR/xpath

## 10.2 Non-Normative

**[OGSI 1.0]**      Open Grid Services Infrastructure (OGSI) V1.0 http://forge.gridforum.org/projects/ggf-editor/document/draft-ogsi-service-1/en/1

**[WS-AtomicTransaction]**      http://www.ibm.com/developerworks/webservices/library/ws-atomtran/

**[WS-Notification]**      http://www.oasis-open.org/apps/org/workgroup/wsn/download.php/6661/WSNpubsub-1-0.pdf

**[WS-ReliableMessaging]**      http://www.ibm.com/developerworks/webservices/library/ws-rm/

**[WS-SecureConversation]**      http://www.ibm.com/developerworks/library/ws-secon/

| 846 | **[WS-Security]** | http://www.oasis-open.org/committees/download.php/5531/oasis-200401-wss-soap-message-security-1.0.pdf |
| 847 | | |
| 848 | **[WS-SecurityPolicy]** | http://www.ibm.com/developerworks/library/ws-secpol/ |

# Appendix B. XML Schema

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

```xml
851  <?xml version="1.0" encoding="UTF-8"?>
852  <!--
853
854  OASIS takes no position regarding the validity or scope of any
855  intellectual property or other rights that might be claimed to
856  pertain to the implementation or use of the technology described
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896    THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED
897    WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
898
899    -->
900    <xsd:schema
901      xmlns="http://www.w3.org/2001/XMLSchema"
902      xmlns:xsd="http://www.w3.org/2001/XMLSchema"
903      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
904      xmlns:wsrp=
905      "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
906    ResourceProperties-1.2-draft-01.xsd"
907      xmlns:wssg=
908        "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ServiceGroup-
909    1.2-draft-01.xsd"
910      xmlns:wsa="http://schemas.xmlsoap.org/ws/2003/03/addressing"
911      elementFormDefault="qualified"
912    attributeFormDefault="unqualified"
913      targetNamespace=
914        "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ServiceGroup-
915    1.2-draft-01.xsd" >
916    <!-- ======================= Imports ============================
917    -->
918
919      <xsd:import
920        namespace="http://schemas.xmlsoap.org/ws/2003/03/addressing"
921        schemaLocation=
922                "http://schemas.xmlsoap.org/ws/2003/03/addressing"
923    />
924        <xsd:import
925          namespace="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
926    ResourceProperties-1.2-draft-01.xsd"
927          schemaLocation="http://docs.oasis-
928    open.org/wsrf/2004/06/wsrf-WS-ResourceProperties-1.2-draft-01.xsd"
929    />
930
931    <!-- =============== Resource Property Related
932    =================== -->
933    <!-- =========== Resource Properties for ServiceGroup
934    =========== -->
935
```

```xsd
936        <xsd:simpleType name="ContentElementsType">
937          <xsd:list itemType="xsd:QName"/>
938        </xsd:simpleType>
939
940        <xsd:element name="MembershipContentRule">
941          <xsd:complexType>
942            <xsd:attribute name="MemberInterface" type="xsd:QName"/>
943            <xsd:attribute name="ContentElements"
944                           type="wssg:ContentElementsType"
945                           use="required"/>
946          </xsd:complexType>
947        </xsd:element>
948
949        <xsd:complexType name="EntryType">
950          <xsd:sequence>
951            <xsd:element name="ServiceGroupEntryEPR"
952                         type="wsa:EndpointReferenceType"
953                         minOccurs="1" maxOccurs="1"
954                         nillable="true"/>
955            <xsd:element name="MemberServiceEPR"
956                         type="wsa:EndpointReferenceType"
957                         minOccurs="1" maxOccurs="1"/>
958            <xsd:element name="Content"
959                         type="xsd:anyType"
960                         minOccurs="1" maxOccurs="1"/>
961          </xsd:sequence>
962        </xsd:complexType>
963
964    <!-- ========= Resource Properties for ServiceGroupEntry
965    ========= -->
966
967      <xsd:element name="Entry"
968                   type="wssg:EntryType"/>
969
970      <xsd:element name="Content"
971                   type="xsd:anyType"/>
972
973      <xsd:element name="MemberEPR"
974                   type="wsa:EndpointReferenceType"/>
975
976      <xsd:element name="ServiceGroupEPR"
977                   type="wsa:EndpointReferenceType"/>
978
979    <!-- = Messages Related to ServiceGroup Change Notification
980    ======= -->
```

```
981      <xsd:complexType
982   name="ServiceGroupModificationNotificationType">
983      <xsd:sequence>
984        <xsd:element name="ServiceGroupEntryEPR"
985                     type="wsa:EndpointReferenceType"
986                     minOccurs="1" maxOccurs="1"
987                     nillable="true"/>
988        <xsd:element name="MemberServiceEPR"
989                     type="wsa:EndpointReferenceType"
990                     minOccurs="1" maxOccurs="1"/>
991        <xsd:element name="Content"
992                     type="xsd:anyType"
993                     minOccurs="0" maxOccurs="1"/>
994      </xsd:sequence>
995   </xsd:complexType>
996
997   <xsd:complexType name="ServiceGroupRemovalNotificationType">
998     <xsd:complexContent>
999       <xsd:extension
1000          base="wssg:ServiceGroupModificationNotificationType">
1001        <xsd:sequence>
1002          <xsd:element name="Reason"
1003                       type="xsd:string"
1004                       minOccurs="0" maxOccurs="1"/>
1005        </xsd:sequence>
1006      </xsd:extension>
1007     </xsd:complexContent>
1008   </xsd:complexType>
1009
1010   <xsd:element name="EntryAdditionNotification"
1011             type="wssg:ServiceGroupModificationNotificationType"
1012  />
1013
1014   <xsd:element name="EntryRemovalNotification"
1015             type="wssg:ServiceGroupRemovalNotificationType" />
1016
1017  </xsd:schema>
```

# 1018 Appendix C. WSDL 1.1

1019 The following illustrates the WSDL 1.1 for the Web service methods described in this specification:

```
1020    <?xml version="1.0" encoding="utf-8"?>
1021    <!--
1022
1023    OASIS takes no position regarding the validity or scope of any
1024    intellectual property or other rights that might be claimed to
1025    pertain to the implementation or use of the technology described
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1040    implement this specification. Please address the information to
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1042
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```

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1065    THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED
1066    WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
1067
1068    -->
1069
1070    <wsdl:definitions name="ServiceGroup"
1071      xmlns="http://schemas.xmlsoap.org/wsdl/"
1072      xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
1073      xmlns:xsd="http://www.w3.org/2001/XMLSchema"
1074      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
1075      xmlns:wsa="http://schemas.xmlsoap.org/ws/2003/03/addressing"
1076      xmlns:wsbf=
1077        "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-BaseFaults-
1078    1.2-draft-01.xsd"
1079      xmlns:wsrp=
1080        "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
1081    ResourceProperties-1.2-draft-01.xsd"
1082      xmlns:wsrpw=
1083        "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
1084    ResourceProperties-1.2-draft-01.wsdl"
1085      xmlns:wsrl=
1086        "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
1087    ResourceLifetime-1.2-draft-01.xsd"
1088      xmlns:wssg=
1089        "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ServiceGroup-
1090    1.2-draft-01.xsd"
1091      xmlns:wssgw=
1092        "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ServiceGroup-
1093    1.2-draft-01.wsdl"
1094      targetNamespace=
1095        "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ServiceGroup-
1096    1.2-draft-01.wsdl">
1097
1098    <!-- ========================= Imports
1099    ========================= -->
1100      <wsdl:import namespace=
1101    "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
1102    ResourceProperties-1.2-draft-01.wsdl"
1103        location=
1104    "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
```

```
1105    ResourceProperties-1.2-draft-01.wsdl" />
1106
1107       <wsdl:import namespace=
1108     "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
1109    ResourceLifetime-1.2-draft-01.wsdl"
1110         location=
1111    "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-
1112    1.2-draft-01.wsdl" />
1113
1114    <!-- ==================== Types Definitions
1115    ===================== -->
1116       <wsdl:types>
1117         <xsd:schema
1118           xmlns:xsd="http://www.w3.org/2001/XMLSchema"
1119           targetNamespace=
1120           "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
1121    ServiceGroup-1.2-draft-01.xsd"
1122            elementFormDefault="qualified"
1123            attributeFormDefault="unqualified">
1124
1125           <xsd:include schemaLocation=
1126    "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ServiceGroup-1.2-
1127    draft-01.xsd" />
1128
1129           <xsd:import namespace=
1130      "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
1131    ResourceLifetime-1.2-draft-01.xsd"
1132              schemaLocation=
1133      "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
1134    ResourceLifetime-1.2-draft-01.xsd"
1135          />
1136
1137         <xsd:import namespace=
1138      "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
1139    ResourceProperties-1.2-draft-01.xsd"
1140          schemaLocation=
1141      "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-
1142    ResourceProperties-1.2-draft-01.xsd"
1143          />
1144
1145         <xsd:import namespace=
1146      "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-BaseFaults-1.2-
1147    draft-01.xsd"
1148             schemaLocation=
1149      "http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-BaseFaults-1.2-
```

```
1150    draft-01.xsd"
1151          />
1152
1153
1154    <!-- =============== Resource Property Related
1155    ================== -->
1156    <!-- =========== Resource Properties for ServiceGroup
1157    ============ -->
1158           <xsd:element name="ServiceGroupRP">
1159             <xsd:complexType>
1160               <xsd:sequence>
1161                 <xsd:element ref="wssg:MembershipContentRule"
1162                             minOccurs="0" maxOccurs="unbounded"/>
1163                 <xsd:element ref="wssg:Entry"
1164                             minOccurs="0" maxOccurs="unbounded"/>
1165               </xsd:sequence>
1166             </xsd:complexType>
1167             <xsd:unique name="UniqueInterfaces">
1168               <xsd:selector
1169                  xpath="./*MembershipContentRule
1170                 [namespace-uri()='http://docs.oasis-
1171    open.org/wsrf/2004/06/wsrf-WS-ServiceGroup-1.2-draft-01.xsd']"/>
1172                 <xsd:field xpath="@MemberInterface"/>
1173             </xsd:unique>
1174           </xsd:element>
1175
1176    <!-- ========== Resource Properties for ServiceGroupEntry
1177    ========= -->
1178           <xsd:element name="ServiceGroupEntryRP">
1179             <xsd:complexType>
1180               <xsd:sequence>
1181                 <xsd:element ref="wssg:ServiceGroupEPR"
1182                             minOccurs="1" maxOccurs="1"/>
1183                 <xsd:element ref="wssg:MemberEPR"
1184                             minOccurs="1" maxOccurs="1"/>
1185                 <xsd:element ref="wssg:Content"
1186                             minOccurs="1" maxOccurs="1"/>
1187               </xsd:sequence>
1188             </xsd:complexType>
1189           </xsd:element>
1190
1191    <!-- ================ Message Specific Types
1192    ==================== -->
1193    <!-- ======= Message Types for ServiceGroupRegistration
1194    ========= -->
```

```
1195                <xsd:element name="Add">
1196                  <xsd:complexType>
1197                    <xsd:sequence>
1198                      <xsd:element name="MemberEPR"
1199                                   type="wsa:EndpointReferenceType" />
1200                      <xsd:element name="Content"
1201                                   type="xsd:anyType" />
1202                      <xsd:element name="InitialTerminationTime"
1203                                   type="xsd:dateTime"
1204                                   minOccurs="0" maxOccurs="1" />
1205                    </xsd:sequence>
1206                  </xsd:complexType>
1207                </xsd:element>
1208
1209                <xsd:element name="AddResponse"
1210                             type="wsa:EndpointReferenceType" />
1211
1212                <xsd:complexType name="ContentCreationFailedFaultType">
1213                  <xsd:complexContent>
1214                    <xsd:extension base="wsbf:BaseFaultType"/>
1215                  </xsd:complexContent>
1216                </xsd:complexType>
1217                <xsd:element name="ContentCreationFailedFault"
1218                             type="wssg:ContentCreationFailedFaultType"/>
1219
1220                <xsd:complexType
1221          name="UnsupportedMemberInterfaceFaultType">
1222                  <xsd:complexContent>
1223                    <xsd:extension base="wsbf:BaseFaultType"/>
1224                  </xsd:complexContent>
1225                </xsd:complexType>
1226                <xsd:element name="UnsupportedMemberInterfaceFault"
1227
1228          type="wssg:UnsupportedMemberInterfaceFaultType"/>
1229
1230                <xsd:complexType name="AddRefusedFaultType">
1231                  <xsd:complexContent>
1232                    <xsd:extension base="wsbf:BaseFaultType"/>
1233                  </xsd:complexContent>
1234                </xsd:complexType>
1235                <xsd:element name="AddRefusedFault"
1236                             type="wssg:AddRefusedFaultType"/>
1237
1238          </xsd:schema>
1239        </wsdl:types>
```

```
1240
1241    <!-- =================== Message Definitions
1242    ==================== -->
1243    <!-- ============== ServiceGroupRegistration::Add
1244    ===============
1245      Add(MemberEPR, Content, [InitialTerminationTime])
1246      returns: EPR to ServiceGroupEntry
1247    -->
1248      <wsdl:message name="AddRequest">
1249        <wsdl:part name="AddRequest" element="wssg:Add"/>
1250      </wsdl:message>
1251
1252      <wsdl:message name="AddResponse">
1253        <wsdl:part name="AddResponse" element="wssg:AddResponse"/>
1254      </wsdl:message>
1255
1256      <wsdl:message name="ContentCreationFailedFault">
1257        <wsdl:part name="ContentCreationFailedFault"
1258                   element="wssg:ContentCreationFailedFault" />
1259      </wsdl:message>
1260
1261      <wsdl:message name="UnsupportedMemberInterfaceFault">
1262        <wsdl:part name="UnsupportedMemberInterfaceFault"
1263                   element="wssg:UnsupportedMemberInterfaceFault" />
1264      </wsdl:message>
1265
1266      <wsdl:message name="AddRefusedFault">
1267        <wsdl:part name="AddRefusedFault"
1268                   element="wssg:AddRefusedFault" />
1269      </wsdl:message>
1270
1271    <!-- =================== PortType Definitions
1272    ==================== -->
1273      <wsdl:portType name="ServiceGroup"
1274                  wsrp:ResourceProperties="wssg:ServiceGroupRP">
1275      <!-- ========== extends wsrp:ResourceProperties ============= --
1276    >
1277        <wsdl:operation name="GetResourceProperty">
1278          <wsdl:input name="GetResourcePropertyRequest"
1279                  message="wsrp:GetResourcePropertyRequest" />
1280          <wsdl:output name="GetResourcePropertyResponse"
1281                  message="wsrp:GetResourcePropertyResponse" />
1282          <wsdl:fault name="ResourceUnknownFault"
1283                  message="wsrp:ResourceUnknownFault" />
1284          <wsdl:fault name="InvalidResourcePropertyQNameFault"
```

```
1285                    message="wsrp:InvalidResourcePropertyQNameFault" />
1286        </wsdl:operation>
1287    </wsdl:portType>
1288
1289    <wsdl:portType name="ServiceGroupEntry"
1290
1291 wsrp:ResourceProperties="wssg:ServiceGroupEntryRP">
1292      <!-- ========= extends wsrp:ResourceProperties ============
1293 -->
1294      <wsdl:operation name="GetResourceProperty">
1295        <wsdl:input name="GetResourcePropertyRequest"
1296                    message="wsrp:GetResourcePropertyRequest" />
1297        <wsdl:output name="GetResourcePropertyResponse"
1298                     message="wsrp:GetResourcePropertyResponse" />
1299        <wsdl:fault name="ResourceUnknownFault"
1300                    message="wsrp:ResourceUnknownFault" />
1301        <wsdl:fault name="InvalidResourcePropertyQNameFault"
1302                    message="wsrp:InvalidResourcePropertyQNameFault"
1303 />
1304      </wsdl:operation>
1305    </wsdl:portType>
1306
1307    <wsdl:portType name="ServiceGroupRegistration"
1308                    wsrp:ResourceProperties="wssg:ServiceGroupRP">
1309      <!-- ========= extends wsrp:ResourceProperties ============
1310 -->
1311      <wsdl:operation name="GetResourceProperty">
1312        <wsdl:input name="GetResourcePropertyRequest"
1313                    message="wsrp:GetResourcePropertyRequest" />
1314        <wsdl:output name="GetResourcePropertyResponse"
1315                    message="wsrp:GetResourcePropertyResponse" />
1316        <wsdl:fault name="ResourceUnknownFault"
1317                    message="wsrp:ResourceUnknownFault" />
1318        <wsdl:fault name="InvalidResourcePropertyQNameFault"
1319                    message="wsrp:InvalidResourcePropertyQNameFault"
1320 />
1321          </wsdl:operation>
1322      <wsdl:operation name="Add">
1323        <wsdl:input name="AddRequest" message="wssg:AddRequest"/>
1324        <wsdl:output name="AddResponse" message="wssg:AddResponse"/>
1325        <wsdl:fault name="ContentCreationFailedFault"
1326                    message="wssg:ContentCreationFailedFault"/>
1327        <wsdl:fault name="UnsupportedMemberInterfaceFault"
1328                    message="wssg:UnsupportedMemberInterfaceFault"/>
1329        <wsdl:fault name="AddRefusedFault"
```

```
1330                                    message="wssg:AddRefusedFault"/>
1331          </wsdl:operation>
1332       </wsdl:portType>
1333
1334    </wsdl:definitions>
```

## 1335 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. |

1336

# Appendix E. Notices