



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 [**WS-Resource**], 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 a "working draft". It is possible that it 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-

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

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

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1 Introduction

In this document, we consider a distributed computing environment consisting of Web services and resources. A pattern defining the relationship between Web services and resources is detailed in “Web Services Resource” **[WS-Resource]**. The term WS-Resource is used to describe the relationship between a Web service and a resource.

This WS-ServiceGroup specification defines a means by which Web services and WS-Resources can be aggregated or grouped together for a domain specific purpose. In order for requestors to form meaningful queries against the contents of the ServiceGroup, membership in the group must be constrained in some fashion. The constraints for membership are expressed by intension using a classification mechanism. Further, the members of each intension must share a common set of information over which queries can be expressed.

In this specification, the ServiceGroup membership rules, membership constraints and classifications are expressed using the resource property model **[WS-ResourceProperties]**. Groups are defined as a collection of members that meet the constraints of the group. The ServiceGroupRegistration interface extends the basic ServiceGroup capabilities with message exchanges for managing the membership of a ServiceGroup.

The ServiceGroup and ServiceGroupRegistration interfaces defined in this document are commonly expected to be composed with other application domain specific interfaces, which define more specialized interaction with the service group and/or with the services that are members of the service group. For example, specialized interfaces may offer means of querying the contents of the ServiceGroup, and for performing collective operations across members of the ServiceGroup.

WS-ServiceGroup is inspired by a portion of the Global Grid Forum’s “Open Grid Services Infrastructure (OGSI) Version 1.0” specification **[OGSI 1.0]**.

1.1 Goals and Requirements

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

1.1.1 Requirements

This specification intends to satisfy the following requirements:

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

1.1.2 Non-Goals

The following topics are outside the scope of this specification:

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

1.2 Notational Conventions

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

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

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

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

```
<!-- sample pseudo-schema -->
<element
  required_attribute_of_type_QName="xs:QName"
  optional_attribute_of_type_string="xs:string"? >
  <required_element />
  <optional_element />?
  <one_or_more_of_these_elements />+
  [ <choice_1 /> | <choice_2 /> ]*
</element>
```

1.3 Namespaces

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/2004/11/wsrf-WS-BaseFaults-1.2-draft-03.xsd
wsrf-rp	http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-ResourceProperties-1.2-draft-05.xsd
wsrf-rpw	http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-ResourceProperties-1.2-draft-05.wsdl
wsrf-rl	http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-ResourceLifetime-1.2-draft-04.xsd
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/2004/11/wsrf-WS-ServiceGroup-1.2-draft-03.xsd
wsrf-sgw	http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-ServiceGroup-1.2-draft-03.wsdl
wstop	http://docs.oasis-open.org/wsn/2004/06/wsn-WS-Topics-1.2-draft-01.xsd

2 Example

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

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

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

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

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

```
...
<wsrf-sg:MembershipContentRule
  ContentElements="ns1:DateOfLastInvoke ns1:Outcome"/>
<wsrf-sg:MembershipContentRule
  MemberInterface="ns2:CatalogPortType"
  ContentElements=""/>
<wsrf-sg:MembershipContentRule
  MemberInterface="ns3:PurchasePortType"
  ContentElements="ns3:PurchaseAmount"/>
...
```

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

```
...
<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.

3 Terminology and Concepts

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

Member:

- o A Web service that belongs to a ServiceGroup. Note, this Web service may be a component of a WS-Resource as defined in "Web Services Resources" [WS-Resource].

ServiceGroup:

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

ServiceGroupEntry:

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

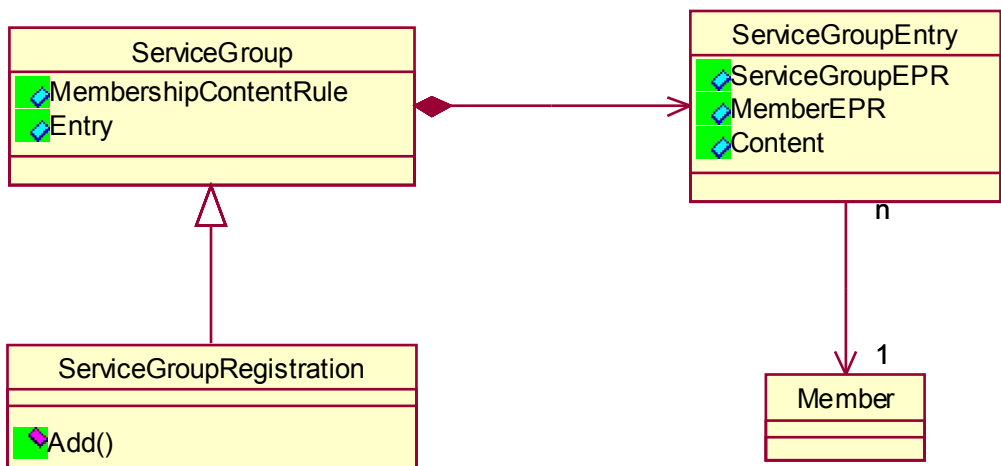
ServiceGroupRegistration:

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

4 Grouping Services

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

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



5 ServiceGroup

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

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

5.1 ServiceGroup ResourceProperties

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

5.1.1 MembershipContentRule Resource Property

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

The ServiceGroup resource property document MAY contain zero MembershipContentRule child elements. When no MembershipContentRule elements are specified, the members of the

ServiceGroup are unconstrained. When the ServiceGroup is unconstrained any member MAY be present in the ServiceGroup.

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

The general form of a MembershipContentRule resource property element is:

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

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

This resource property element is further constrained as follows:

/wsrf-sg:MembershipContentRule

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

/wsrf-sg:membershipContentRule/@MemberInterface

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

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

/wsrf-sg:membershipContentRule/@ContentElements

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

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

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

5.1.2 Entry Resource Property

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

```
<wsrf-sg:Entry>
  <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:Entry>
```

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

This resource property element is further constrained as follows

/wsrf-sg:Entry

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

/wsrf-sg:Entry/ServiceGroupEntryEPR

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

/wsrf-sg:Entry/MemberServiceEPR

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

6 ServiceGroupEntry

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

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

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

6.1 ServiceGroupEntry: Resource Property Declarations

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

6.1.1 ServiceGroupEPR

The general form of a ServiceGroupEPR resource property element is:

```
<wsrf-sg:ServiceGroupEPR>  
  wsa:EndpointReferenceType  
</wsrf-sg:ServiceGroupEPR>
```

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

This resource property element is further constrained as follows:

/wsrf-sg:ServiceGroupEPR

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

6.1.2 MemberEPR

The general form of a MemberEPR resource property element is:

```
<wsrf-sg:MemberEPR>
```



```
wsa:EndpointReferenceType
</wsrf-sg:MemberEPR>
```

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

This resource property element is further constrained as follows:

/wsrf-sg:MemberEPR

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

6.1.3 Content

The general form of the Content resource property element is:

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

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

This resource property element is further constrained as follows:

/wsrf-sg:Content

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

6.2 ServiceGroupEntry: Message Exchanges

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

7 ServiceGroupRegistration

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

7.1 ServiceGroupRegistration: Resource Property Declarations

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

7.2 Add

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

```
<wsrf-sgw:Add>
  <wsrf-sgw:MemberEPR>
    wsa:EndpointReferenceType
  </wsrf-sgw:MemberEPR>
  <wsrf-sgw:Content>
    {any}
  </wsrf-sgw:Content>
  <wsrf-sgw:InitialTerminationTime>
    xsd:dateTime
  </wsrf-sgw:InitialTerminationTime>?
</wsrf-sgw:Add>
```

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

/wsrf-sgw:Add/MemberEPR

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

/wsrf-sgw:Add/Content

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

/wsrf-sgw: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/2004/11/wsrf-WS-ServiceGroup-1.2-draft-03.wSDL/ServiceGroupRegistration/AddRequest>.
464

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-sgw:AddResponse>  
468   wsa:endpointReferenceType  
469 </wsrf-sgw: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**].
475

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/2004/11/wsrf-WS-ServiceGroup-1.2-draft-03.wSDL/ServiceGroupRegistration/AddResponse>.
478

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 Other Faults

492 7.2.1 Example SOAP Encoding of the Add Message Exchange

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

```
496 <s12:Envelope  
497   xmlns:s12="http://www.w3.org/2003/05/soap-envelope">
```

```

498     xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
499     xmlns:wsnt=
500         "http://docs.oasis-open.org/wsr/2004/06/wsn-WS-
501 BaseNotification-1.2-draft-01.xsd"
502     xmlns:wsrf-rl=
503         "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-
504 ResourceLifetime-1.2-draft-04.xsd"
505     xmlns:wsrf-sg=
506         "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-
507 ServiceGroup-1.2-draft-03.xsd"
508     xmlns:wsrf-sgw=
509         "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-
510 ServiceGroup-1.2-draft-03.wsdl"
511     xmlns:npex="http://www.producer.org/RefProp">
512     <s12:Header>
513         <wsa:Action>
514             http://docs.oasis-open.org/wsr/2004/11/wsr/WS-
515 ServiceGroup-1.2-draft-03.wsdl/ServiceGroupRegistration/AddRequest
516         </wsa:Action>
517         <wsa:To s12:mustUnderstand="1">
518             http://www.producer.org/ServiceGroupEndpoint
519         </wsa:To>
520     </s12:Header>
521     <s12:Body>
522         <wsrf-sgw:Add>
523             <wsrf-sgw:MemberEPR>
524                 <wsa:Address>
525                     http://www.producer.org/ProducerEndpoint
526                 </wsa:Address>
527                 <wsa:ReferenceProperties>
528                     <npex:ResourceDisambiguator>
529                         uuid:84decd55-7d3f-65ad-ac44-675d9fce5d22
530                     </npex:ResourceDisambiguator>
531                 </wsa:ReferenceProperties>
532             </wsrf-sgw:MemberEPR>
533             </wsrf-sgw:Content>
534             <wstop:Topic>wsrf-
535 rp:ResourcePropertiesValueChanges</wstop:Topic>
536             <wsrf-sgw:Content>
537                 <wsrf-sgw:InitialTerminationTime>
538                     2003-12-25T00:00:00.000000Z
539                 </wsrf-sgw:InitialTerminationTime>
540             </wsrf-sgw:Add>

```

```
541     </s12:Body>
542 </s12:Envelope>
```

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

```
545 <s12:Envelope
546     xmlns:s12="http://www.w3.org/2003/05/soap-envelope"
547     xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
548     xmlns:npex="http://www.consumer.org/RefProp">
549     xmlns:wsrf-sg=
550         "http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-
551 ServiceGroup-1.2-draft-03.xsd"
552     xmlns:wsrf-sgw=
553         "http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-
554 ServiceGroup-1.2-draft-03.wSDL"
555     <s12:Header>
556         <wsa:Action>
557             http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-
558 ServiceGroup-1.2-
559 draft.03.wSDL/ServiceGroupRegistration/AddResponse
560         </wsa:Action>
561         <npex:ResourceDisambiguator>
562             uuid:84decd55-7d3f-65ad-ac44-675d9fce12ef
563         </npex:ResourceDisambiguator>
564     </s12:Header>
565     <s12:Body>
566         <wsrf-sgw:AddResponse>
567             <wsa:EndpointReference>
568                 <wsa:Address>
569                     http://www.producer.org/ServiceGroupEndpoint
570                 </wsa:Address>
571                 <wsa:ReferenceProperties>
572                     <npex:ResourceDisambiguator>
573                         uuid:95fefeb3-f37d-5dfe-44fe-675d9fce12df
574                     </npex:ResourceDisambiguator>
575                 </wsa:ReferenceProperties>
576             </wsa:EndpointReference>
577         </wsrf-sgw:AddResponse>
578     </s12:Body>
579 </s12:Envelope>
```

8 Notification of ServiceGroup Modification

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

```
<wstop:TopicSpace name="ServiceGroupTopicSpace"
  targetNamespace=
    "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-
ServiceGroup-1.2-draft-03.xsd"
  xmlns:wsrf-rp=
    "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-
ResourceProperties-1.2-draft-05.xsd"
  xmlns:wstop=
    "http://docs.oasis-open.org/wsn/2004/06/wsn-WS-Topics-1.2-
draft-01.xsd" >
  <wstop:Topic name="ServiceGroupModification" >
    <wstop:MessagePattern>
      <wsrf-rp:QueryExpression
        dialect="http://www.w3.org/TR/1999/REC-xpath-19991116"
      >
        boolean((/*/*EntryAdditionNotification
          \[namespace-uri()='http://docs.oasis-
open.org/wsr/2004/06/wsr/WS-ServiceGroup-1.2-draft-01.xsd']) |
          (/*/*EntryRemovalNotification
            \[namespace-uri()='http://docs.oasis-
open.org/wsr/2004/06/wsr/WS-ServiceGroup-1.2-draft-01.xsd']))
        boolean(/*/*EntryAdditionNotification |
          /*/*EntryRemovalNotification)
      </wsrf-rp:QueryExpression>
    </wstop:MessagePattern>
  </wstop:Topic>
</wstop:TopicSpace>
```

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

/wstop:TopicSpace/@name

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

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

629 /wstop:Topic/@name
 630 The name of the Topic representing ServiceGroup modifications MUST be named
 631 "ServiceGroupModification". The namespace property of this topic MUST be the WS-
 632 ServiceGroup XML namespace (<http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ServiceGroup-1.2-draft-01.xsd>).

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

638 8.1 EntryAdditionNotification Message

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

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

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

651 /wsrf-sg:EntryAdditionNotification
 652 One EntryAdditionNotification element is created for each ServiceGroupEntry addition
 653 situation detected by the service associated with ServiceGroup resource. This artifact
 654 records the addition of an entry to the ServiceGroup.

655 /wsrf-sg:EntryAdditionNotification/ServiceGroupEntryEPR
 656 This element MUST contain the EndpointReference of the ServiceGroupEntry that was
 657 added to the ServiceGroup.

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

665 8.2 EntryRemovalNotification Message

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

668	<wsrf-sg:EntryRemovalNotification>
669	<wsrf-sg:ServiceGroupEntryEPR>
670	wsa:EndpointReferenceType
671	</wsrf-sg:ServiceGroupEntryEPR>
672	<wsrf-sg:MemberServiceEPR>
673	wsa:EndpointReferenceType
674	</wsrf-sg:MemberServiceEPR>
675	<wsrf-sg:Content>{any}</wsrf-sg:Content>?
676	<wsrf-sg:Reason>xsd:string</wsrf-sg:Reason>?
677	</wsrf-sg:EntryRemovalNotification>

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

679 /wsrf-sg:EntryRemovalNotification
 680 One EntryRemovalNotification element is created for each ServiceGroupEntry removal
 681 situation detected by the service associated with ServiceGroup resource. This artifact
 682 records the removal of an entry to the ServiceGroup.
 683 /wsrf-sg:EntryRemovalNotification/ServiceGroupEntryEPR
 684 This element MUST contain the EndpointReference of the ServiceGroupEntry that was
 685 removed to the ServiceGroup. Note: The EndpointReference for the ServiceGroupEntry will
 686 not be a valid reference since the removal mechanism from a ServiceGroup is removal of
 687 the ServiceGroupEntry.
 688 /wsrf-sg:EntryRemovalNotification/MemberServiceEPR
 689 This element MUST contain the EndpointReference of the member service that the WS-
 690 Resource referenced by @serviceGroupEntryEPR contains in its MemberEPR resource
 691 property.
 692 /wsrf-sg:EntryRemovalNotification/Content
 693 If this optional element is present, it MUST contain a copy, from some point prior to the
 694 removal, of the Contents resource property element of the ServiceGroupEntry referenced
 695 by @ServiceGroupEntryEPR.

696 /wsrf-sg:EntryRemovalNotification/Reason

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

9 Security Model

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

702 9.1 Securing the message exchanges

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

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

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

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

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

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

- 734 • **Message alteration** – Alteration is prevented by including signatures of the message
735 information using WS-Security.

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

9.2 Securing the resource properties

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

9.2.1 A Note on MembershipContentRules

The MembershipContentRules resource property along with Entry resource property provide a mechanism to allow for requestors to query about the members of a service group based on their interface or a resource property that is contained in member WS-Resource's resource properties document, as well as the value of a resource property itself. There may need to be privacy considerations with respect to exposing those values. Therefore, authorization policies as well as message protection policies should be consistent between these values retrieved through ServiceGroup, and those values retrieved through the WS-Resource itself. In general, it is not a

775 good practice to form membership rules based on properties whose values are to remain
776 confidential.

Appendix A. Acknowledgments

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10References

10.1 Normative

- [RFC 2119] S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*, <http://www.ietf.org/rfc/rfc2119.txt>, IETF RFC 2119, March 1997.
- [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.
- [WS-Resource] <http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-Resource-1.2-draft-02.pdf>
- [WS-Addressing] <http://www.w3.org/Submission/2004/SUBM-ws-addressing-20040810>
- [WS-BaseNotification] <http://docs.oasis-open.org/wsn/2004/06/wsn-WS-BaseNotification-1.2-draft-03.pdf>
- [WS-ResourceLifetime] <http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-ResourceLifetime-1.2-draft-04.pdf>
- [WS-ResourceProperties] <http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-ResourceProperties-1.2-draft-05.pdf>
- [WS-Security] <http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-soap-message-security-1.0.pdf>
- [WS-Topics] <http://docs.oasis-open.org/wsn/2004/06/wsn-WS-Topics-1.2-draft-01.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>
- [SOAP 1.2] <http://www.w3.org/TR/soap12-part1/>
- [WSDL 2.0] <http://www.w3.org/TR/wsdl12/>
- [WS-AtomicTransaction] <http://www.ibm.com/developerworks/webservices/library/ws-atomtran/>
- [WS-Policy] <http://www.ibm.com/developerworks/library/ws-policy>
- [WS-ReliableMessaging] <http://www.ibm.com/developerworks/webservices/library/ws-rm/>

839 [WS-SecureConversation] <http://www.ibm.com/developerworks/library/ws-secon/>
840 [WS-SecurityPolicy] <http://www.ibm.com/developerworks/library/ws-secpol/>
841 [WS-Trust] <http://www.ibm.com/developerworks/library/specification/ws-trust/>
842

Appendix B. XML Schema

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

```
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891 WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
892
893 -->
894 <xsd:schema
895     xmlns="http://www.w3.org/2001/XMLSchema"
896     xmlns:xsd="http://www.w3.org/2001/XMLSchema"
897     xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
898     xmlns:wsrf-rp=
899     "http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-
900 ResourceProperties-1.2-draft-05.xsd"
901     xmlns:wsrf-sg=
902     "http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-ServiceGroup-
903 1.2-draft-03.xsd"
904     xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
905     elementFormDefault="qualified"
906     attributeFormDefault="unqualified"
907     targetNamespace=
908     "http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-ServiceGroup-
909 1.2-draft-03.xsd" >
910 <!-- ===== Imports =====
911 -->
912
913     <xsd:import
914         namespace="http://schemas.xmlsoap.org/ws/2004/08/addressing"
915         schemaLocation=
916             "http://schemas.xmlsoap.org/ws/2004/08/addressing"
917     />
918     <xsd:import
919         namespace="http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-
920 ResourceProperties-1.2-draft-05.xsd"
921         schemaLocation="http://docs.oasis-
922 open.org/wsrf/2004/11/wsrf-WS-ResourceProperties-1.2-draft-05.xsd"
923     />
924
925 <!-- ===== Resource Property Related

```

```

926 ===== -->
927 <!-- ===== Resource Properties for ServiceGroup
928 ===== -->
929
930 <xsd:simpleType name="ContentElementsType">
931   <xsd:list itemType="xsd:QName"/>
932 </xsd:simpleType>
933
934 <xsd:element name="MembershipContentRule">
935   <xsd:complexType>
936     <xsd:attribute name="MemberInterface" type="xsd:QName"/>
937     <xsd:attribute name="ContentElements"
938                   type="wsrf-sg:ContentElementsType"
939                   use="required"/>
940   </xsd:complexType>
941 </xsd:element>
942
943 <xsd:complexType name="EntryType">
944   <xsd:sequence>
945     <xsd:element name="ServiceGroupEntryEPR"
946                 type="wsa:EndpointReferenceType"
947                 minOccurs="1" maxOccurs="1"
948                 nillable="true"/>
949     <xsd:element name="MemberServiceEPR"
950                 type="wsa:EndpointReferenceType"
951                 minOccurs="1" maxOccurs="1"/>
952     <xsd:element name="Content"
953                 type="xsd:anyType"
954                 minOccurs="1" maxOccurs="1"/>
955   </xsd:sequence>
956 </xsd:complexType>
957
958 <!-- ===== Resource Properties for ServiceGroupEntry
959 ===== -->
960
961 <xsd:element name="Entry"
962             type="wsrf-sg:EntryType"/>
963
964 <xsd:element name="Content"
965             type="xsd:anyType"/>
966
967 <xsd:element name="MemberEPR"
968             type="wsa:EndpointReferenceType"/>

```

```

969
970     <xsd:element name="ServiceGroupEPR"
971               type="wsa:EndpointReferenceType"/>
972
973 <!-- = Messages Related to ServiceGroup Change Notification
974 ===== -->
975     <xsd:complexType
976 name="ServiceGroupModificationNotificationType">
977         <xsd:sequence>
978             <xsd:element name="ServiceGroupEntryEPR"
979                   type="wsa:EndpointReferenceType"
980                   minOccurs="1" maxOccurs="1"
981                   nillable="true"/>
982             <xsd:element name="MemberServiceEPR"
983                   type="wsa:EndpointReferenceType"
984                   minOccurs="1" maxOccurs="1"/>
985             <xsd:element name="Content"
986                   type="xsd:anyType"
987                   minOccurs="0" maxOccurs="1"/>
988         </xsd:sequence>
989     </xsd:complexType>
990
991     <xsd:complexType name="ServiceGroupRemovalNotificationType">
992         <xsd:complexContent>
993             <xsd:extension
994                 base="wsrf-
995 sg:ServiceGroupModificationNotificationType">
996                 <xsd:sequence>
997                     <xsd:element name="Reason"
998                           type="xsd:string"
999                           minOccurs="0" maxOccurs="1"/>
1000                 </xsd:sequence>
1001             </xsd:extension>
1002         </xsd:complexContent>
1003     </xsd:complexType>
1004
1005     <xsd:element name="EntryAdditionNotification"
1006               type="wsrf-
1007 sg:ServiceGroupModificationNotificationType" />
1008
1009     <xsd:element name="EntryRemovalNotification"
1010               type="wsrf-sg:ServiceGroupRemovalNotificationType"
1011 />

```

1012
1013

```
</xsd: schema>
```

Appendix C. WSDL 1.1

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

```
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1061 THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED
1062 WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
1063
1064 -->
1065
1066 <wsdl:definitions name="ServiceGroup"
1067 xmlns="http://schemas.xmlsoap.org/wsdl/"
1068 xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
1069 xmlns:xsd="http://www.w3.org/2001/XMLSchema"
1070 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
1071 xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
1072 xmlns:wsrf-bf=
1073 "http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-BaseFaults-
1074 1.2-draft-03.xsd"
1075 xmlns:wsrf-rp=
1076 "http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-
1077 ResourceProperties-1.2-draft-05.xsd"
1078 xmlns:wsrf-rpw=
1079 "http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-
1080 ResourceProperties-1.2-draft-05.wsdl"
1081 xmlns:wsrf-rl=
1082 "http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-
1083 ResourceLifetime-1.2-draft-04.xsd"
1084 xmlns:wsrf-sg=
1085 "http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-ServiceGroup-
1086 1.2-draft-03.xsd"
1087 xmlns:wsrf-sgw=
1088 "http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-ServiceGroup-
1089 1.2-draft-03.wsdl"
1090 targetNamespace=
1091 "http://docs.oasis-open.org/wsrf/2004/11/wsrf-WS-ServiceGroup-
1092 1.2-draft-03.wsdl">
1093
1094 <!-- ===== Imports
1095 ===== -->
1096 <wsdl:import namespace=

```

1097 "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-
1098 ResourceProperties-1.2-draft-05.wsdl"
1099     location=
1100 "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-
1101 ResourceProperties-1.2-draft-05.wsdl" />
1102
1103     <wsdl:import namespace=
1104 "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-
1105 ResourceLifetime-1.2-draft-04.wsdl"
1106     location=
1107 "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-ResourceLifetime-
1108 1.2-draft-04.wsdl" />
1109
1110     <xsd:import namespace=
1111 "http://schemas.xmlsoap.org/ws/2004/08/addressing"
1112     schemaLocation=
1113 "http://schemas.xmlsoap.org/ws/2004/08/addressing"
1114     />
1115
1116 <!-- ===== Types Definitions
1117 ===== -->
1118     <wsdl:types>
1119         <xsd:schema
1120             xmlns:xsd="http://www.w3.org/2001/XMLSchema"
1121             targetNamespace=
1122 "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-
1123 ServiceGroup-1.2-draft-03.xsd"
1124             elementFormDefault="qualified"
1125             attributeFormDefault="unqualified">
1126
1127             <xsd:include schemaLocation=
1128 "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-ServiceGroup-1.2-
1129 draft-03.xsd" />
1130
1131             <xsd:import namespace=
1132 "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-
1133 ResourceLifetime-1.2-draft-04.xsd"
1134             schemaLocation=
1135 "http://docs.oasis-open.org/wsr/2004/11/wsr/WS-
1136 ResourceLifetime-1.2-draft-04.xsd"
1137             />
1138
1139             <xsd:import namespace=

```

```

1140     "http://docs.oasis-open.org/wsrp/2004/11/wsrp-WS-
1141 ResourceProperties-1.2-draft-05.xsd"
1142     schemaLocation=
1143     "http://docs.oasis-open.org/wsrp/2004/11/wsrp-WS-
1144 ResourceProperties-1.2-draft-05.xsd"
1145     />
1146
1147     <xsd:import namespace=
1148     "http://docs.oasis-open.org/wsrp/2004/11/wsrp-WS-BaseFaults-1.2-
1149 draft-03.xsd"
1150     schemaLocation=
1151     "http://docs.oasis-open.org/wsrp/2004/11/wsrp-WS-BaseFaults-1.2-
1152 draft-03.xsd"
1153     />
1154
1155
1156 <!-- ===== Resource Property Related
1157 ===== -->
1158 <!-- ===== Resource Properties for ServiceGroup
1159 ===== -->
1160     <xsd:element name="ServiceGroupRP">
1161     <xsd:complexType>
1162     <xsd:sequence>
1163     <xsd:element ref="wsrf-sg:MembershipContentRule"
1164     minOccurs="0" maxOccurs="unbounded"/>
1165     <xsd:element ref="wsrf-sg:Entry"
1166     minOccurs="0" maxOccurs="unbounded"/>
1167     </xsd:sequence>
1168     </xsd:complexType>
1169     <xsd:unique name="UniqueInterfaces">
1170     <xsd:selector
1171     xpath="./wssg:MembershipContentRule"/>
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="wsrf-sg:ServiceGroupEPR"
1182     minOccurs="1" maxOccurs="1"/>

```



```

1183         <xsd:element ref="wsrf-sg:MemberEPR"
1184             minOccurs="1" maxOccurs="1"/>
1185         <xsd:element ref="wsrf-sg: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="wsrf-bf:BaseFaultType"/>
1215         </xsd:complexContent>
1216     </xsd:complexType>
1217     <xsd:element name="ContentCreationFailedFault"
1218         type="wsrf-
1219 sg:ContentCreationFailedFaultType"/>
1220
1221     <xsd:complexType
1222 name="UnsupportedMemberInterfaceFaultType">
1223         <xsd:complexContent>
1224             <xsd:extension base="wsrf-bf:BaseFaultType"/>
1225         </xsd:complexContent>

```

```

1226         </xsd:complexType>
1227         <xsd:element name="UnsupportedMemberInterfaceFault"
1228                     type="wsrf-
1229 sg:UnsupportedMemberInterfaceFaultType"/>
1230
1231         <xsd:complexType name="AddRefusedFaultType">
1232             <xsd:complexContent>
1233                 <xsd:extension base="wsrf-bf:BaseFaultType"/>
1234             </xsd:complexContent>
1235         </xsd:complexType>
1236         <xsd:element name="AddRefusedFault"
1237                     type="wsrf-sg:AddRefusedFaultType"/>
1238
1239     </xsd:schema>
1240 </wsdl:types>
1241
1242 <!-- ===== Message Definitions
1243 ===== -->
1244 <!-- ===== ServiceGroupRegistration::Add
1245 =====
1246     Add(MemberEPR, Content, [InitialTerminationTime])
1247     returns: EPR to ServiceGroupEntry
1248 -->
1249     <wsdl:message name="AddRequest">
1250         <wsdl:part name="AddRequest" element="wsrf-sg:Add"/>
1251     </wsdl:message>
1252
1253     <wsdl:message name="AddResponse">
1254         <wsdl:part name="AddResponse" element="wsrf-sg:AddResponse"/>
1255     </wsdl:message>
1256
1257     <wsdl:message name="ContentCreationFailedFault">
1258         <wsdl:part name="ContentCreationFailedFault"
1259                     element="wsrf-sg:ContentCreationFailedFault" />
1260     </wsdl:message>
1261
1262     <wsdl:message name="UnsupportedMemberInterfaceFault">
1263         <wsdl:part name="UnsupportedMemberInterfaceFault"
1264                     element="wsrf-sg:UnsupportedMemberInterfaceFault"
1265 />
1266     </wsdl:message>
1267
1268     <wsdl:message name="AddRefusedFault">

```

```

1269     <wsdl:part name="AddRefusedFault"
1270           element="wsrf-sg:AddRefusedFault" />
1271   </wsdl:message>
1272
1273   <!-- ===== PortType Definitions
1274   ===== -->
1275   <wsdl:portType name="ServiceGroup"
1276         wsrf-rp:ResourceProperties="wsrf-sgw:ServiceGroupRP">
1277     <wsdl:operation name="GetResourceProperty">
1278         <wsdl:input name="GetResourcePropertyRequest"
1279               message="wsrf-rpw:GetResourcePropertyRequest" />
1280         <wsdl:output name="GetResourcePropertyResponse"
1281               message="wsrf-rpw:GetResourcePropertyResponse" />
1282         <wsdl:fault name="ResourceUnknownFault"
1283               message="wsrf-rpw:ResourceUnknownFault" />
1284         <wsdl:fault name="InvalidResourcePropertyQNameFault"
1285               message="wsrf-rpw:InvalidResourcePropertyQNameFault"
1286         />
1287     </wsdl:operation>
1288   </wsdl:portType>
1289
1290   <wsdl:portType name="ServiceGroupEntry"
1291         wsrf-rp:ResourceProperties="wsrf-
1292   sgw:ServiceGroupEntryRP">
1293     <wsdl:operation name="GetResourceProperty">
1294         <wsdl:input name="GetResourcePropertyRequest"
1295               message="wsrf-rpw:GetResourcePropertyRequest" />
1296         <wsdl:output name="GetResourcePropertyResponse"
1297               message="wsrf-rpw:GetResourcePropertyResponse"
1298         />
1299         <wsdl:fault name="ResourceUnknownFault"
1300               message="wsrf-rpw:ResourceUnknownFault" />
1301         <wsdl:fault name="InvalidResourcePropertyQNameFault"
1302               message="wsrf-
1303   rpw:InvalidResourcePropertyQNameFault" />
1304     </wsdl:operation>
1305   </wsdl:portType>
1306
1307   <wsdl:portType name="ServiceGroupRegistration"
1308         wsrf-rp:ResourceProperties="wsrf-
1309   sgw:ServiceGroupRP">
1310     <wsdl:operation name="GetResourceProperty">
1311         <wsdl:input name="GetResourcePropertyRequest"

```

1312	message="wsrf-rpw:GetResourcePropertyRequest" />
1313	<wsdl:output name="GetResourcePropertyResponse"
1314	message="wsrf-rpw:GetResourcePropertyResponse"
1315	/>
1316	<wsdl:fault name="ResourceUnknownFault"
1317	message="wsrf-rpw:ResourceUnknownFault" />
1318	<wsdl:fault name="InvalidResourcePropertyQNameFault"
1319	message="wsrf-
1320	rpw:InvalidResourcePropertyQNameFault" />
1321	</wsdl:operation>
1322	<wsdl:operation name="Add">
1323	<wsdl:input name="AddRequest" message="wsrf-
1324	sgw:AddRequest"/>
1325	<wsdl:output name="AddResponse" message="wsrf-
1326	sgw:AddResponse"/>
1327	<wsdl:fault name="ContentCreationFailedFault"
1328	message="wsrf-sgw:ContentCreationFailedFault"/>
1329	<wsdl:fault name="UnsupportedMemberInterfaceFault"
1330	message="wsrf-
1331	sgw:UnsupportedMemberInterfaceFault"/>
1332	<wsdl:fault name="AddRefusedFault"
1333	message="wsrf-sgw:AddRefusedFault"/>
1334	</wsdl:operation>
1335	</wsdl:portType>
1336	
1337	</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: - 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

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