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Abstract:

The SCA Web Service binding specified in this document applies to the services and references of an SCA composites. It defines the manner in which a service can be made available as a web service, and in which a reference can invoke a web service.

This binding is a WSDL-based binding; that means it either references an existing WSDL binding or allows one to specify enough information to generate one. When an existing WSDL binding is not referenced, rules defined in this document allow one to generate a WSDL binding.

Status:

This document was last revised or approved by the OASIS Service Component Architecture / Bindings (SCA-Bindings) TC on the above date. The level of approval is also listed above. Check the “Latest Version” or “Latest Approved Version” location noted above for possible later revisions of this document.

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... [1]

1 Introduction

The SCA Web Service binding specified in this document applies to the services and references of composites and components [SCA-Assembly]. It defines the manner in which a service can be made available as a web service, and in which a reference can invoke a web service.

This binding is a WSDL-based binding; that means it either references an existing WSDL binding or can be configured to specify enough information to generate one. When an existing WSDL binding is not referenced, rules defined in this document allow one to generate a WSDL binding.

The Web Service binding can point to an existing WSDL [WSDL] document, separately authored, that specifies the details of the WSDL binding to be used to provide or invoke the web service. In this case the SCA web services binding allows anything that is valid in a WSDL binding, including rpc-encoded style and binding extensions. It is the responsibility of the SCA system provider to ensure support for all options specified in the WSDL binding. Interoperation of such services is not guaranteed.

The SCA Web Service binding also provides attributes that can be used to provide the details of a WSDL SOAP binding. This allows a WSDL document to be synthesized in the case that one does not already exist. In this case only WS-I compliant mapping is supported.

The SCA Web Service binding can be further customized through the use of SCA Policy Sets. For example, a requirement to conform to a WS-I profile [WSI-Profiles] could be represented with a policy set.

[This specification also defines a protocol for implementing callbacks using the WS-Addressing Message Addressing Properties \[WS-Addr\].](#)

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Mentioning portType here does not seem appropriate.

Comment [ask2]: Page: 5
Dave would like to get rid of this.

1.1 Terminology

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

This specification uses predefined namespace prefixes throughout; they are given in the following list. Note that the choice of any namespace prefix is arbitrary and not semantically significant.

Table 1-1 Prefixes and Namespaces used in this specification

Prefix	Namespace	Notes
xs	"http://www.w3.org/2001/XMLSchema"	Defined by XML Schema 1.0 specification
wsa	"http://www.w3.org/2005/08/addressing"	Defined by WS-Addressing 1.0
wsp	"http://www.w3.org/ns/ws-policy"	Defined by WS-Policy 1.5
wsrmp	"http://docs.oasis-open.org/ws-rx/wsrmp/200702"	Defined by WS-ReliableMessaging Policy 1.2
soap11	"http://schemas.xmlsoap.org/soap/envelope/"	Defined by SOAP 1.1
soap12	"http://www.w3.org/2005/08/addressing"	Defined by SOAP 1.2
wsdl	"http://www.w3.org/ns/wsdl-instance"	Defined by WSDL 2.0
wsoap11	"http://schemas.xmlsoap.org/wsdl/soap/"	Defined by WSDL 1.1 [WSDL11]
wsoap12	"http://schemas.xmlsoap.org/wsdl/soap12/"	Defined by [WSDL11-SOAP12]
sca	"http://docs.oasis-open.org/ns/opencsa/sca/200712"	Defined by the SCA specifications

27

28 1.2 Normative References

- 29 [RFC2119] S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*,
30 <http://www.ietf.org/rfc/rfc2119.txt>, IETF RFC 2119, March 1997.
- 31 [SCA-Assembly] <http://docs.oasis-open.org/opencsa/sca-assembly/sca-assembly-1.1-spec.pdf>
- 32 [SCA-Policy] <http://docs.oasis-open.org/opencsa/sca-policy/sca-policy-1.1-spec.pdf>
- 33 [SCA-JCAA] <http://docs.oasis-open.org/opencsa/sca-j/sca-javacaa-1.1-spec.pdf>
- 34 [WSDL11] E. Christensen et al, *Web Service Description Language (WSDL) 1.1*,
35 <http://www.w3.org/TR/2001/NOTE-wsdl-20010315>, W3C Note, March 15 2001.
- 36 [WSDL] E. Christensen et al, *Web Service Description Language (WSDL) 1.1*,
37 <http://www.w3.org/TR/2001/NOTE-wsdl-20010315>, W3C Note, March 15 2001.
- 38 R. Chinnici et al, *Web Service Description Language (WSDL) Version 2.0 Part 1: Core*
39 *Language*, <http://www.w3.org/TR/2007/REC-wsdl20-20070626/>, W3C
40 Recommendation, June 26 2007.
- 41 [WSI-Profiles] <http://www.ws-i.org/Profiles/BasicProfile-1.1.html>
- 42 <http://www.ws-i.org/Profiles/AttachmentsProfile-1.0.html>
- 43 <http://www.ws-i.org/Profiles/SimpleSoapBindingProfile-1.0.html>
- 44 <http://www.ws-i.org/Profiles/BasicSecurityProfile-1.0.html>
- 45 [JAX-WS] <http://jcp.org/en/jsr/detail?id=224>
- 46 [SOAP] <http://www.w3.org/TR/2003/REC-soap12-part1-20030624/>
- 47 <http://www.w3.org/TR/2000/NOTE-SOAP-20000508/>
- 48 [SOAP12Adjuncts] SOAP Version 1.2 Part 2: Adjuncts (Second Edition)
49 <http://www.w3.org/TR/soap12-part2/>
- 50 [WS-Addr] <http://www.w3.org/TR/2006/REC-ws-addr-core-20060509/>
- 51 [WS-Addr-SOAP] <http://www.w3.org/TR/2006/REC-ws-addr-soap-20060509/>
- 52 [WSDL11-SOAP12] <http://www.w3.org/Submission/wsdl11soap12/>
- 53 [WS-MC] <http://docs.oasis-open.org/ws-rx/wsmc/200702/wsmc-1.1-spec-os.html>
- 54 [WS-Policy] <http://www.w3.org/TR/2007/REC-ws-policy-20070904>
- 55 [WS-PA] <http://www.w3.org/TR/2007/REC-ws-policy-attach-20070904>
- 56

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57 1.3 Non-Normative References

- 58 [WSI-AP] <http://www.ws-i.org/Profiles/AttachmentsProfile-1.0.html>
- 59 [MTOM] <http://www.w3.org/TR/2005/REC-soap12-mtom-20050125/>
- 60 [WS-RM] <http://docs.oasis-open.org/ws-rx/wsrn/200702/wsrn-1.2-spec-cd-01.html>
- 61 [WS-Security] <http://docs.oasis-open.org/wss/v1.1/wss-v1.1-spec-os-SOAPMessageSecurity.pdf>
- 62

2 Web Service Binding Schema

The Web Service binding element is defined by the following pseudo-schema.

```
<binding.ws name="xs:NCName"?
  requires="list of xs:QName"?
  policySets="list of xs:QName"?
  uri="xs:anyURI"?
  wsdlElement="xs:anyURI"?
  wsdl:wsdlLocation="list of xs:anyURI pairs"?
  ...>
  <endpointReference>...</endpointReference>*
  ...
</binding.ws>
```

- */binding.ws/@name* - as defined in the SCA Assembly Specification [SCA-Assembly].
- */binding.ws/@requires* - as defined in the SCA Assembly Specification [SCA-Assembly].
- */binding.ws/@policySets* - as defined in the SCA Assembly Specification [SCA-Assembly].
- */binding.ws/@uri* - the resolution algorithm of Section 2.1 below describes how this attribute is interpreted.
- */binding.ws/@wsdlElement* – when present this attribute specifies the URI of a WSDL element. This attribute points to the specified element in an existing WSDL document. The URI can have the following forms:
 - Service:
`<WSDL-namespace-URI>#wsdl.service(<service-name>)`
In this case, the SCA runtime MUST make all the ports in the WSDL Service that have equivalent portTypes with the SCA service or reference available to the SCA service or reference.
 - Port (WSDL 1.1):
`<WSDL-namespace-URI>#wsdl.port(<service-name>/<port-name>)`
In this case, the port in the WSDL 1.1 Service identified by the `<binding.ws>` element MUST implement a portType that is equivalent to the one specified for the SCA service or reference. The identified port MUST be made available to the SCA service or reference by the SCA runtime.
 - Endpoint (WSDL 2.0):
`<WSDL-namespace-URI>#wsdl.endpoint(<service-name>/<endpoint-name>)`
In this case, the endpoint in the WSDL 2.0 Service identified by the `<binding.ws>` element MUST have an equivalent portType with the SCA service or reference. The identified endpoint MUST be made available to the SCA service or reference by the SCA runtime.
 - Binding:
`<WSDL-namespace-URI>#wsdl.binding(<binding-name>)`
In this case, the WSDL binding identified by the `<binding.ws>` element MUST implement a portType that is equivalent to the one specified for the SCA service or reference. The SCA runtime MUST make the service or reference available via the specified WSDL binding. In this case, the endpoint address URI for an SCA reference MUST be specified by either the `@uri` attribute on the binding or a WS-Addressing *EndpointReference* element, except where the SCA Assembly specification states that the `@uri` attribute can be omitted. The endpoint address URI for an SCA service or the callback

106 element of an SCA reference is determined as specified in section 2.1. For the *callback* element of an
107 SCA service, the binding MUST NOT specify an endpoint address URI or a WS-Addressing
108 EndpointReference..

- 109 • */binding.ws/@wsdl:wsdlLocation* – when present this attribute specifies the location(s) of the WSDL
110 document(s) associated with specific namespace(s). This attribute MAY be specified by the binding in the
111 event that the <WSDL-namespace-URI> in the ‘endpoint’ attribute is not dereferencable, or when the
112 intended WSDL document is to be found at a different location than the one pointed to by the <WSDL-
113 namespace-URI>. The use of this attribute indicates that the WSDL binding points to an existing WSDL
114 document. The semantics of this attribute are specified in Section 7.1 of WSDL 2.0 [WSDL].
- 115 • */binding.ws/endpointReference* – when present this element provides the WS-Addressing [WS-Addr]
116 EndpointReference that specifies the endpoint for the service or reference. When this element is present
117 along with the @wsdlElement attribute on the parent element, the @wsdlElement attribute value MUST be
118 of the ‘Binding’ form as specified above, i.e. <WSDL-namespace-URI>#wsdl.binding(<binding-name>).
- 119 • */binding.ws/@{any}* - this is an extensibility mechanism to allow extensibility via attributes.
- 120 • */binding.ws/any* – this is an extensibility mechanism to allow extensibility via elements.

121
122 The SCA runtime MUST support all the attributes of the <binding.ws> element, namely @name, @uri,
123 @requires, @policySets @wsdlElement, and @wsdl:wsdlLocation.

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124 The SCA runtime SHOULD support the element <endpointReference>. If an SCA runtime does not support the
125 element <endpointReference>, then it MUST reject an SCA WS Binding XML document (as defined in Section
126 6.1) that contains the element.

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127 The <binding.ws> element MUST conform to the XML schema defined in sca-binding-webservice.xsd.

128 2.1 Endpoint URI resolution

129 The rules for resolving the URI at which an SCA service is hosted, or SCA reference targets, when used with
130 binding.ws (in precedence order) are:

- 131 1. The URIs in the endpoint(s) of the referenced WSDL
132 or
133 The URI specified by the *wsa:Address* element of the *endpointReference*,
- 134 2. The explicitly stated URI in the @uri attribute of the *binding.ws* element, which can be relative,
- 135 3. The structural URI as defined by the Assembly specification

136 An SCA runtime MUST follow rules listed above in determining the URI at which an SCA service is hosted or
137 an SCA reference is targeted.

138 The URI in the WSDL endpoint or in the *wsa:Address* of an EPR MAY be a relative URI, in which case it is
139 relative to the URI defined in (2) or (3). The *wsa:Address* element MAY be the empty relative URI, in which
140 case it uses the URI defined in (2) or (3) directly. This enables the EPR writer to specify reference parameters,
141 metadata and other EPR contents while letting the deployer choose the URI.

142 To reference a WSDL document and also specify an EPR, the @wsdlElement attribute MUST refer to a binding
143 element in the WSDL.

144 2.2 Interface mapping

145 When *binding.ws* is used on a service or reference with an interface that is not defined by *interface.wsdl*, then a
146 WSDL portType for the service or reference is derived from the interface by the rules defined for that SCA
147 interface type. An SCA runtime MUST raise an error if the interface does not map to a WSDL portType.

148 For example, for *interface.java*, the mapping to a WSDL portType is as defined in the SCA Java Common
149 Annotations and API Specification [SCA-JCAA].

150 *binding.ws* implementations can use appropriate standards, for example WS-I AP 1.0 [WSI-AP] or MTOM
151 [MTOM], to map interface parameters to binary attachments transparently to the target component.
152

153 2.3 Production of WSDL description for an SCA service

154 Any service hosted by an SCA runtime with one or more web service bindings with HTTP endpoints SHOULD
155 return a WSDL description of the service in response to an HTTP GET request with the “?wsdl” suffix to that
156 HTTP endpoint. If none of the web service bindings have HTTP endpoints, then some other means of obtaining
157 the WSDL description of the service SHOULD be provided by the SCA runtime. This can include out of band
158 mechanisms, for example publication to a UDDI registry.

159 Refer to section 4 for a detailed definition of the rules that SHOULD be used for generating the WSDL
160 description of an SCA service with one or more web service bindings.

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162 2.4 Additional binding configuration data

163 SCA runtime implementations MAY provide additional metadata that is associated with a web service binding,
164 for example to enable JAX-WS [JAX-WS] handlers to be executed as part of the target component dispatch.
165 The specification of such metadata is SCA runtime-specific and is outside of the scope of this document.

166

167 2.5 Web Service Binding and SOAP Intermediaries

168 The Web Service binding does not provide any direct or explicit support for SOAP intermediaries [SOAP].

169

170 2.6 Support for WSDL extensibility

171 When a *binding.ws* element uses the @wsdlElement attribute, the details of the binding are specified by the
172 WSDL element referenced by the value of the attribute. Per the WSDL specification, WSDL allows for
173 extensibility via elements as well as attributes, and it specifies rules for processing such elements. This
174 specification does not constrain the use of such extensibility in WSDL and relies on the rules specified in the
175 WSDL specification for processing such extended elements.

176 This specification requires that an SCA runtime MUST support the WSDL extensions defined in the namespace
177 associated with the prefix “sca” (as defined in section 1.1).

178 The SCA runtime MUST support the WSDL 1.1 binding extension for SOAP 1.1 over HTTP [WSDL11], as
179 identified by the WSDL element wsoap11:binding that has the @transport attribute with a value of
180 “http://schemas.xmlsoap.org/soap/http”.

181 The SCA runtime SHOULD support the WSDL 1.1 binding extension for SOAP 1.2 over HTTP [WSDL11-
182 SOAP12], as identified by the WSDL element wsoap12:binding that has the @transport attribute with a value of
183 “http://schemas.xmlsoap.org/soap/http”.

184 Because a WSDL document might contain extension elements that cannot be supported by the SCA runtime,
185 when using the @wsdlElement form of *binding.ws* it is not possible to determine whether the binding is
186 supported by the SCA runtime without parsing the referenced WSDL element and its dependent elements.

187 2.7 Intents listed in the bindingType

188 This specification places no requirements on the intents that are listed as either @alwaysProvides or
189 @mayProvides in the bindingType for *binding.ws*.

190 **2.8 Intents and binding configuration**

191 This binding mandates support for SOAP 1.1 and encourages SOAP 1.2 support. The <bindingType> element
192 associated with this binding MUST include the SOAP.1_1 intent in its @mayProvides or @alwaysProvides
193 attributes. If the <bindingType> element associated with this binding does not include the SOAP.1_1 intent in
194 its @alwaysProvides attribute, then the <bindingType> element SHOULD include the SOAP.1_2 intent in its
195 @mayProvides attribute. For more details on the <bindingType> element see [SCA-Policy].

196 The SCA runtime MUST raise an error if the web service binding is configured with a policy intent(s) that
197 conflicts with a binding instance's configuration. For example, it is an error to use the SOAP policy intent in
198 combination with a WSDL binding that does not use SOAP.

199 3 Web Service Binding Examples

200 The following snippets show the sca.composite file for the MyValueComposite file containing the service
201 element for the MyValueService and reference element for the StockQuoteService. Both the service and the
202 reference use a Web Service binding.

203

204 3.1 Example Using WSDL documents

205 This example shows a service and reference using the SCA Web Service binding, using existing WSDL
206 documents in both cases. In each case there is a single binding element, whose name defaults to the
207 service/reference name.

208 The service's binding is defined by the WSDL document associated with the given URI. This service conforms
209 to WS-I Basic Profile 1.1.

210 The reference's first binding is defined by the specified WSDL service in the WSDL document at the given
211 location. The reference can use any of the WSDL service's ports/endpoints to invoke the target service. The
212 reference's second binding is defined by the specified WSDL binding. The specific endpoint URI to be invoked
213 is provided via the @uri attribute.

214

```
215 <?xml version="1.0" encoding="ASCII"?>
216 <composite xmlns="http://docs.oasis-open.org/ns/opencsa/sca/200712"
217   name="MyValueComposite">
218   <service name="MyValueService">
219     <interface.java interface="services.myvalue.MyValueService"/>
220     <binding_ws wsdlElement="http://www.example.org/MyValueService#
221       wsdl.endpoint(MyValueService/MyValueServiceSOAP)"/>
222     ...
223   </service>
224   ...
225   <reference name="StockQuoteReference1">
226     <interface.java interface="services.stockquote.StockQuoteService"/>
227     <binding_ws wsdlElement="http://www.example.org/StockQuoteService#
228       wsdl.service(StockQuoteService)"
229       wsdl:wsdlLocation="http://www.example.org/StockQuoteService
230       http://www.example.org/StockQuoteService.wsdl"/>
231   </reference>
232   <reference name="StockQuoteReference2">
233     <interface.java interface="services.stockquote.StockQuoteService"/>
234     <binding_ws wsdlElement="http://www.example.org/StockQuoteService#
235       wsdl.binding(StockQuoteBinding)"
236       wsdl:wsdlLocation="http://www.example.org/StockQuoteService
237       http://www.example.org/StockQuoteService.wsdl"
238       uri="http://www.example.org/StockQuoteService5"/>
239   </reference>
240 </composite>
```

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244 3.2 Examples Without a WSDL Document

245 The next example shows the simplest form of the binding element without WSDL document, assuming all
246 defaults for portType mapping and SOAP binding synthesis. The service and reference each have a single
247 binding element, whose name defaults to the service/reference name.

248 The service is to be made available at a location determined by the deployment of this component. It will have
249 a single port address and SOAP binding, with a simple WS-I BasicProfile 1.1 compliant binding, and using the
250 default options for mapping the Java interface to a WSDL portType.

251 The reference indicates a service to be invoked which has a SOAP binding and portType that matches the
252 default options for binding synthesis and interface mapping. One particular use of this case would be where the
253 reference is to an SCA service with a web service binding which itself uses all the defaults.

254

```
255 <?xml version="1.0" encoding="ASCII"?>
256 <composite xmlns="http://docs.oasis-open.org/ns/opencsa/sca/200712"
257     name="MyValueComposite">
258
259     <service name="MyValueService">
260         <interface.java interface="services.myvalue.MyValueService"/>
261         <binding.ws/>
262         ...
263     </service>
264
265     ...
266
267     <reference name="StockQuoteService">
268         <interface.java interface="services.stockquote.StockQuoteService"/>
269         <binding.ws uri="http://www.example.org/StockQuoteService"/>
270     </reference>
271 </composite>
```

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272 The next example shows the use of the binding element without a WSDL document, with multiple SOAP
273 bindings with non-default values. The SOAP 1.2 binding name defaults to the service name, the SOAP 1.1
274 binding is given an explicit name. The reference has a web service binding which uses SOAP 1.2, but
275 otherwise uses all the defaults for SOAP binding. The reference binding name defaults to the reference name.
276

277

```
278 <?xml version="1.0" encoding="ASCII"?>
279 <composite xmlns="http://docs.oasis-open.org/ns/opencsa/sca/200712"
280     name="MyValueComposite">
281
282     <service name="MyValueService">
283         <interface.java interface="services.myvalue.MyValueService"/>
284         <binding.ws name="MyValueServiceSOAP11" requires="SOAP_1_1"/>
285         <binding.ws requires="SOAP_1_2"/>
286         ...
287     </service>
288
289     ...
290
291     <reference name="StockQuoteService">
292         <interface.java interface="services.stockquote.StockQuoteService"/>
293         <binding.ws uri="http://www.example.org/StockQuoteService"
294             requires="SOAP_1_2"/>
295     </reference>
296 </composite>
```

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298 3.3 Example PolicySet Providing The Conversation Intent

299 The following policy set applies to *binding.ws* and provides the conversation intent. The conversation intent is
300 provided by using WS-ReliableMessaging [WS-RM] protocol which has a concept of a Sequence. This
301 Sequence (which appears as a *wsm:Sequence* SOAP header in the message) is used as a correlation
302 mechanism, on the wire, to implement conversational semantics.

```
303 <policySet name="WSRM-Sequence-based-conversation"  
304     provides="sca:conversation"  
305     appliesTo="sca:binding.ws">  
306   <wsp:Policy>  
307     <wsrmp:RMAssertion  
308       xmlns:wsrmp="http://docs.oasis-open.org/ws-rx/wsrmp/200608"/>  
309   </wsp:Policy>  
310 </policySet>
```

311

312 4 Transport Binding

313 The `binding.ws` element provides numerous ways to specify exactly how messages ought to be transmitted from
314 or to the reference or service. Those ways include references to WSDL binding elements from the
315 `@wsdlElement` attribute, policy intents, and even vendor extensions within the `binding.ws` element. However,
316 all of those ways to indicate how messages get carried happen to be optional. This section describes the defaults
317 to be used if the specific transport details are not otherwise specified.

318 4.1 Intents

319 So as to narrow the range of choices for how messages are carried, the following policy intents affect the
320 transport binding:

- 321 • SOAP
322 This indicates that messages **MUST** be transmitted using SOAP. One or more SOAP versions can be used.
- 323 • SOAP.1_1
324 Messages **MUST** be transmitted using only SOAP 1.1.
- 325 • SOAP.1_2
326 Messages **MUST** be transmitted using only SOAP 1.2.

327 4.2 Default Transport Binding Rules

328 4.2.1 WS-I Basic Profile Alignment

329 To align to WS-I Basic Profile, the resulting WSDL port needs to be all document-literal, or all rpc-literal
330 binding (R2705). This means, for any given portType, for all messages referenced by all operations in that
331 portType, either

- 332 • that every message part references an XML Schema type (rpc-literal pattern)
- 333 • or that every message references exactly zero or one XML Schema elements (document-literal pattern)

334 For a service element, the portType from the service's interface or derived from the service's interface **MUST** fit
335 one of these two patterns. The rest of this section assumes the short-hand reference of an "rpc-literal" or
336 "document-literal" pattern, depending on which of the two bullet points above it matches.

337 4.2.2 Default Transport Binding Rules

338 In the event that the transport details are not otherwise determined, an SCA runtime **MUST** enable the following
339 configuration:

- 340 • HTTP-based transfer protocol
- 341 • Bindings for SOAP 1.1 **MUST** be provided and additional bindings **MAY** be provided, unless policy is
342 applied that explicitly restricts this.
- 343 • "literal" format as described in section 3.5 of [WSDL11]
- 344 • For document literal pattern, each message uses "document" style, as per section 3.5 of [WSDL11].
- 345 • For rpc-literal pattern, each message uses "rpc" style, as per section 3.5 of [WSDL11]. In this case, the
346 child elements of the SOAP Body element **MUST** be namespace qualified with a non-empty
347 namespace name. This namespace **SHOULD** be the structural URI associated with the binding.
- 348 • For SOAP 1.1 messages, the SOAPAction HTTP header described in section 6.1.1 represents the
349 empty string, in quotes ("").

- 350
- 351
- 352
- For SOAP 1.2 messages, the SOAP Action feature described in section 6.5 of [\[SOAP12Adjuncts\]](#) does not appear.
 - All WSDL message parts are carried in the SOAP body

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5 Implementing SCA Callbacks using Web Services

5.1 SCA Web Services Callback Protocol

This section defines the SCA Web Services callback protocol that can be used to implement a bidirectional interface in conjunction with the Web Services binding. For examples of wire messages exchanged when using this protocol see the appendix SCA Web Services Callback Protocol Message Examples.

An SCA Runtime MAY implement SCA callback services over the Web services binding using WS-Addressing 1.0 capabilities, as defined by the SCA Web Services Callback Protocol. [BWS50002]

To implement the SCA Web Services Callback Protocol, an SCA binding follows the following rules.

1. Every request message that invokes the forward interface MUST contain a Callback EPR. [BWS50003] The Callback EPR MUST be carried in the request message in one of the following ways:

- a. If the request message contains the wsa:From SOAP header block then the wsa:From header block specifies the Callback EPR.
- b. If the wsa:From header block is not present then the wsa:ReplyTo header block specifies the Callback EPR.

[BWS50004]

If the Callback EPR's [address] value is "http://www.w3.org/2005/08/addressing/anonymous" OR "http://www.w3.org/2005/08/addressing/none" then the SCA runtime MUST generate the Invalid Addressing Header fault as specified in WS-Addressing 1.0 SOAP Binding, Section 6.4.1 [WS-Addr-SOAP]. [BWS50005] Such a fault can include additional [Subsubcode] wsa:OnlyNonAnonymousAddressSupported.

2. A request message that invokes the forward interface can contain the wsa:MessageID SOAP header block. If there is a need to have the callback request message correlated to an individual forward request message, the wsa:MessageID SOAP header block can be used for this purpose.

3. When the service implementation invokes the callback interface, it MUST use the Callback EPR from a request message that invoked the forward interface [BWS50006], as specified in BWS50003 and BWS50004. Once the Callback EPR is selected, the SCA runtime MUST follow the rules defined in WS-Addressing 1.0 Core Section 3.3 to invoke operations on the callback interface. [BWS50007]

When the service invokes the callback interface, if the request message from which the Callback EPR was obtained contained the wsa:MessageID SOAP header block, the SCA runtime MUST include a wsa:RelatesTo SOAP header block in the callback message. [BWS50008] The wsa:RelatesTo SOAP header block MUST have the relationship type value of "http://docs.oasis-open.org/opencsa/sca-bindings/ws/callback" and the related message id MUST be the wsa:MessageID of the message from which the Callback EPR was obtained. [BWS50009]

If the request message from which the Callback EPR was obtained did not contain the wsa:MessageID SOAP header block, the SCA runtime MUST NOT include a

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396 [wsa:RelatesTo](#) SOAP header block with a relationship type value of
397 "[http://docs.oasis-open.org/opencsa/sca-bindings/ws/callback](#)" in the callback
398 [message](#). [BWS50010]

399 [When a service that offers a bidirectional interface is invoked, depending on the](#)
400 [semantics and/or implementation of the service, it is possible that the service might](#)
401 [invoke the callback interface before the forward operation ends. In such cases, it is](#)
402 [necessary for the binding on the reference-side to be listening for callback request\(s\)](#)
403 [from the service, before the forward operation request is sent on the wire to the service,](#)
404 [and continue listening as long as callback requests are expected. It is possible that](#)
405 [before the response to the forward request is sent a response to one or more callback](#)
406 [requests are required by the service.](#)

407 **5.2 SCA Web Services Callback with WS-MakeConnection Protocol**

408 [It is possible that the invoker of a service that uses a bidirectional interface has a](#)
409 [binding that cannot accept connections for callbacks from a service \(for example, when](#)
410 [it has the `noListener` intent \[SCA-Policy\]\). When this is the case, it is necessary for the](#)
411 [binding to support a polling mechanism. An example of a polling mechanism is WS-](#)
412 [MakeConnection. \[WS-MC\].](#)

413 [For the Web services binding, an SCA Runtime MAY implement SCA callback services](#)
414 [over the Web services binding using WS-Addressing 1.0 capabilities combined with WS-](#)
415 [MakeConnection, as described in \[the SCA Web Services Callback with WS-\]\(#\)](#)
416 [MakeConnection Protocol. \[BWS50011\] When an SCA runtime does implement such a](#)
417 [capability, it MUST adhere to the rules described \[for the SCA Web Services Callback\]\(#\)](#)
418 [Protocol and also to those of WS-MakeConnection, in addition to the rules described \[for\]\(#\)](#)
419 [the SCA Web Services Callback with WS-MakeConnection Protocol. \[BWS50012\]](#)

420 [The Callback EPR's \[address\] value present in the request message that invoked the](#)
421 [forward interface MUST follow the form of the MakeConnection Anonymous URI, i.e.](#)
422 ["\[http://docs.oasis-open.org/ws-rx/wsmc/200702/anonymous?id={unique-\]\(#\)](#)
423 [String}". \[BWS50013\]](#)

424 [The unique-String value is a globally unique value such as a UUID, as defined by the](#)
425 [WS-MakeConnection specification.](#)

426 [When the service implementation invokes the callback interface, it uses the Callback EPR](#)
427 [from a request message that invoked the forward interface, and the callback request](#)
428 [message MUST be sent as the response to a `wsmc:MakeConnection` message that](#)
429 [contains the `wsmc:Address` value that matches the MakeConnection Anonymous URI in](#)
430 [the Callback EPR. \[BWS50014\]](#)

431 [When a service that offers a bidirectional interface is invoked using WS-MakeConnection](#)
432 [Anonymous URI as the value for the Callback EPR address, depending on the semantics](#)
433 [and/or implementation of the service, it is possible that the service might invoke the](#)
434 [callback interface before the forward operation ends. In such cases, it is necessary for](#)
435 [the binding on the reference-side to start polling for callback request\(s\) from the](#)
436 [service, before or right after the forward operation request is sent and before a response](#)
437 [is received, and continue polling as long as callback requests are expected. It is possible](#)
438 [that before the response to the forward request is sent a response to one or more](#)
439 [callback requests are required by the service.](#)

440 **5.3 Policy Assertion for SCA Web Services Callback Protocol**

441 [WS-Policy Framework \[WS-Policy\] and WS-Policy Attachment \[WS-PA\] collectively define](#)
442 [a framework, model and grammar for expressing the requirements, and general](#)

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443 [characteristics of entities in an XML Web services-based system. To enable a Web](#)
444 [service client and a Web service to describe their requirements for implementing SCA](#)
445 [Web Services Callback Protocol \(see SCA Web Services Callback Protocol\), this](#)
446 [specification defines a single policy assertion that leverages the WS-Policy framework.](#)

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447 **5.3.1 Assertion Model**

448 [The WSCallback policy assertion indicates that the Web service client and the Web](#)
449 [service MUST use SCA Web Services Callback Protocol to implement callbacks.](#)
450 [Specifically, the protocol determines the requirements on forward request message, the](#)
451 [EPR used for callbacks and the requirements on the callback request message.](#)

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452 **5.3.2 Normative Outline**

453 [The normative outline for the WSCallback assertion is:](#)

```
454 <sca:WSCallback ...>  
455 ...  
456 </sca:WSCallback>
```

457
458 [The following describes the content model of the WSCallback element.](#)

- 459 • [/sca:WSCallback: A policy assertion that specifies that WSCallback protocol](#)
460 [MUST be used when sending messages.](#)

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461 **5.3.3 Assertion Attachment**

462 [The WSCallback policy assertion is allowed to have the following Policy Subjects \[WS-](#)
463 [PA\]:](#)

- 464 • [Endpoint Policy Subject](#)

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465 [WS-PolicyAttachment defines a set of WSDL/1.1 policy attachment points for each of the](#)
466 [above Policy Subjects. Since a WSCallback policy assertion specifies a concrete behavior,](#)
467 [it MUST NOT be attached to the abstract WSDL policy attachment points. \[BWS50015\]](#)

468 [The following is the list of WSDL/1.1 elements whose scope contains the Policy Subjects](#)
469 [allowed for a WSCallback policy assertion but which MUST NOT have WSCallback policy](#)
470 [assertions attached:](#)

- 471 • [wsdl:portType](#)

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472 [\[BWS50016\]](#)

473 [The following is the list of WSDL/1.1 elements whose scope contains the Policy Subjects](#)
474 [allowed for a WSCallback policy assertion and which MAY have WSCallback policy](#)
475 [assertions attached:](#)

- 476 • [wsdl:port](#)
- 477 • [wsdl:binding](#)

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478 [\[BWS50017\]](#)

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479 **5.3.4 Assertion Example**

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480 [The example below shows the use of the WSCallback policy assertion in a WSDL](#)
481 [document.](#)

482

```

483 (01)<wsdl:definitions
484 (02)   targetNamespace="example.com"
485 (03)   xmlns:tns="example.com"
486 (04)   xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
487 (05)   xmlns:wsp="http://www.w3.org/ns/ws-policy"
488 (06)   xmlns:sca="http://docs.oasis-open.org/ns/opencsa/sca/200903"
489 (07)   xmlns:wssu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-
490 wssecurity-utility-1.0.xsd">
491 (08)
492 (09)   <wsp:UsingPolicy wsdl:required="true" />
493 (10)
494 (11)   <wsp:Policy wsu:Id="MyPolicy" >
495 (12)     <sca:WSCallback/>
496 (13)   </wsp:Policy>
497 (14)
498 (15)   <!-- omitted elements -->
499 (16)
500 (17)   <wsdl:binding name="MyBinding" type="tns:MyPortType" >
501 (18)     <wsp:PolicyReference URI="#MyPolicy" />
502 (19)   <!-- omitted elements -->
503 (20)   </wsdl:binding>
504 (21)
505 (22)</wsdl:definitions>

```

506

507 Line (09) in the example above indicates that WS-Policy is in use as a required
508 extension. Lines (11-13) are a policy expression that includes a WSCallback policy
509 assertion (line 12) to indicate that SCA Web Services Callback protocol must be used.
510 Lines (17-20) are a WSDL binding. Line (18) indicates that the policy in lines (11-13)
511 applies to this binding, specifically indicating that SCA Web Services Callback protocol
512 must be used over all the messages in the binding.

513 **5.3.5 Security Considerations**

514 Policies and assertions SHOULD be signed to prevent tampering. [BWS50018] Policies
515 SHOULD NOT be accepted unless they are signed and have an associated security token
516 to specify the signer has proper claims for the given policy. [BWS50019] That is, a
517 relying party shouldn't rely on a policy unless the policy is signed and presented with
518 sufficient claims to pass the relying parties acceptance criteria.

519 It should be noted that the mechanisms described in this document could be secured as
520 part of a SOAP message using WS-Security [WS-Security] or embedded within other
521 objects using object-specific security mechanisms.

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522 6 Conformance

523 The XML schema pointed to by the RDDL document at the namespace URI, defined by this specification, are
524 considered to be authoritative and take precedence over the XML schema defined in the appendix of this
525 document.

526 There are two categories of artifacts for which this specification defines conformance:

- 527 a) SCA WS Binding XML Document
- 528 b) SCA Runtime

529

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530 6.1 SCA WS Binding XML Document

531 An SCA WS Binding XML document is an SCA Composite Document, or an SCA
532 ComponentType Document, as defined by the SCA Assembly specification Section 13.1
533 [SCA-Assembly], that uses the <binding.ws> element.

534 An SCA WS Binding XML document MUST be a conformant SCA Composite Document or
535 a SCA ComponentType Document, as defined by the SCA Assembly specification [SCA-
536 ASSEMBLY], and MUST comply with all the applicable requirements specified in this
537 specification.

538

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539 6.2 SCA Runtime

540 An implementation that claims to conform to the requirements of an SCA Runtime
541 defined in this specification has to meet the following conditions:

- 542 1. The implementation MUST comply with all statements in Appendix XXX:
543 Conformance Items related to an SCA Runtime, except for those that originate
544 from Section 5, notably all "MUST" statements have to be implemented.
- 545 2. The implementation MAY support the SCA Web Services Callback Protocol. If it
546 does, it MUST comply with all statements in Appendix XXX: Conformance Items
547 for the SCA Web Services Callback Protocol
- 548 3. The implementation MAY support the SCA Web Services Callback with WS-
549 MakeConnection Protocol. If it does, it MUST comply with all statements in
550 Appendix XXX: Conformance Items for the SCA Web Services Callback with WS-
551 MakeConnection Protocol
- 552 4. The implementation MUST conform to the SCA Assembly Model Specification
553 Version 1.1 [SCA-Assembly], and to the SCA Policy Framework Version 1.1 [SCA-
554 Policy].
- 555 5. The implementation MUST reject a SCA WS Binding XML Document that is not
556 conformant per Section 6.1.

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559 **A. Web Services Binding XML Schema: sca-binding-**
560 **webservice.xsd**

```
561 <?xml version="1.0" encoding="UTF-8"?>
562 <!-- (c) Copyright OASIS 2006, 2008 -->
563 <schema xmlns="http://www.w3.org/2001/XMLSchema"
564   targetNamespace="http://docs.oasis-open.org/ns/opencsa/sca/200712"
565   xmlns:sca="http://docs.oasis-open.org/ns/opencsa/sca/200712"
566   xmlns:wsdl="http://www.w3.org/ns/wsdl-instance"
567   xmlns:wsa="http://www.w3.org/2005/08/addressing"
568   elementFormDefault="qualified">
569
570   <import namespace="http://www.w3.org/ns/wsdl-instance"
571     schemaLocation="http://www.w3.org/2007/05/wsdl/wsdl20-instance.xsd"
572   />
573   <import namespace="http://www.w3.org/2005/08/addressing"
574     schemaLocation="http://www.w3.org/2006/03/addressing/ws-addr.xsd"
575   />
576   <include schemaLocation="sca-core.xsd"/>
577
578   <element name="binding.ws" type="sca:WebServiceBinding"
579     substitutionGroup="sca:binding"/>
580   <complexType name="WebServiceBinding">
581     <complexContent>
582       <extension base="sca:Binding">
583         <sequence>
584           <element name="endpointReference"
585             type="wsa:EndpointReference"
586             minOccurs="0" maxOccurs="unbounded"/>
587           <any namespace="##other" processContents="lax"
588             minOccurs="0" maxOccurs="unbounded"/>
589         </sequence>
590         <attribute name="wsdlElement" type="anyURI" use="optional"/>
591         <attribute ref="wsdl:wsdlLocation" use="optional"/>
592         <anyAttribute namespace="##any" processContents="lax"/>
593       </extension>
594     </complexContent>
595   </complexType>
596 </schema>
```

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B. Conformance Items

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This section contains a list of conformance items for the SCA Web Service Binding specification.

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B.1 Conformance Items for the SCA Web Services Callback

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<u>Conformance ID</u>	<u>Description</u>
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<u>[BWS50015]</u>	
<u>[BWS50065]</u>	
<u>[BWS50017]</u>	
<u>[BWS50018]</u>	
<u>[BWS50019]</u>	

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B.2 Conformance Items for the SCA Web Services Callback with WS-MakeConnection Protocol

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C. SCA Web Services Callback Protocol Policy Assertion XML Schema: sca-binding-webservice- callback.xsd

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- (c) Copyright OASIS 2006, 2008 -->
<schema xmlns="http://www.w3.org/2001/XMLSchema"
  targetNamespace="http://docs.oasis-open.org/ns/opencsa/sca/200903"
  elementFormDefault="qualified">

  <element name="WSCallback">
    <complexType>
      <sequence>
        <any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
      <anyAttribute namespace="##any" processContents="lax"/>
    </complexType>
  </element>
</schema>
```

628

D. Appendix - WSDL Generation

629 Due to the number of factors that determine how a WSDL might be generated, including compatibility with
630 existing WSDL uses, precise details cannot be specified. For example, implementation decisions can affect the
631 way WSDL might be generated. For reference, and consistency, this section suggests non-normative choices for
632 some of the various details involved in generating WSDL. For brevity, the following definitions apply:

- 633 • component name = the value of the @name attribute of the component element containing the
634 binding.ws element
- 635 • service name = the value of the @name attribute of the service element containing the binding.ws
636 element
- 637 • binding name = the value of @name attribute of the binding.ws element, or the default if no @name
638 attribute is present
- 639 • SOAP version = either "SOAP11" or "SOAP12" as appropriate

640 With those definitions in place, here are the suggested choices:

- 641 • wsdl:definitions/@name = <component name> + "." + <service name>
- 642 • wsdl:definitions/@targetNamespace = <structural URI for the service>
- 643 • import each WSDL 1.1 portType, rather than putting them inline
- 644 • wsdl:binding/@name = <binding name> + <SOAP version> + "Binding"
- 645 • wsdl:service/@name = <service name>
- 646 • wsdl:port/@name = <binding name> + <SOAP version> + "Port"

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E. SCA Web Services Callback Protocol Message Examples

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The message examples in this section are for a configuration that consists of a reference R that is wired to a Service S. S has a bidirectional interface and the binding used in both directions, forward and callback, is binding.ws configured for SOAP. The forward interface and the callback interface both contain a single one-way operation.

The following message exchanges take place between R and S:

1. R invokes the forward operation and sets the callback address to RC1. Let's call the message that invokes the forward operation R1. S then calls the callback operation twice. Let's call the callback messages S1 and S2
2. R invokes the forward operation again with the same callback address RC1. Let's call the message that invokes the forward operation R2. S then calls the callback operation once. Let's call the callback message S3.
3. R invokes the forward operation yet another time, but this time uses a difference callback address: RC2. Let's call the message that invokes the forward operation R3. S then calls the callback operation twice. Let's call the callback messages S4 and S5.

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The messages R1, R2, R3, S1, S2, S3, S4 and S4 are listed below. The namespace prefix 'soap' can be bound to either the SOAP 1.1 or SOAP 1.2 namespace. The 'wsa' prefix is bound to the WS-Addressing 1.0 namespace.

R1:

```
<soap:Envelope ...>
  <soap:Header>
    <wsa:From>
      <wsa:Address>http://example.com/callback</wsa:Address>
    <wsa:ReferenceProperties>
      <myNS:SomeID>1</myNS:SomeID>
    </wsa:ReferenceProperties>
  </wsa:From>
  <wsa:MessageID>urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6</wsa:messageID>
  ...
</soap:Header>
<soap:Body>
  ...
</soap:Body>
</soap:Envelope>
```

S1, S2:

```
687 <soap:Envelope ...>
688 <soap:Header>
689 <wsa:To>http://example.com/callback</wsa:To>
690 <myNS:SomeID>1</myNS:SomeID>
691 <wsa:RelatesTo RelationshipType="http://docs.oasis-open.org/opencsa/sca-
692 bindings/ws/callback">urn:uuid:f81d4fae-7dec-11d0-a765-
693 00a0c91e6bf6</wsa:RelatesTo>
694 ...
695 </soap:Header>
696 <soap:Body>
697 ...
698 </soap:Body>
699 </soap:Envelope>
700
```

701

702 **R2:**

```
703 <soap:Envelope ...>
704 <soap:Header>
705 <wsa:From>
706 <wsa:Address>http://example.com/callback</wsa:Address>
707 <wsa:ReferenceProperties>
708 <myNS:SomeID>1</myNS:SomeID>
709 </wsa:ReferenceProperties>
710 </wsa:From>
711 <wsa:MessageID>urn:uuid:f81d4fae-8dec-11d0-a765-
712 00a0c91e6bf6</wsa:messageID>
713 ...
714 </soap:Header>
715 <soap:Body>
716 ...
717 </soap:Body>
718 </soap:Envelope>
719
```

720

721 **S3:**

```
722 <soap:Envelope ...>
723 <soap:Header>
724 <wsa:To>http://example.com/callback</wsa:To>
725 <myNS:SomeID>1</myNS:SomeID>
726 <wsa:RelatesTo RelationshipType="http://docs.oasis-open.org/opencsa/sca-
727 bindings/ws/callback">
728 urn:uuid:f81d4fae-8dec-11d0-a765-00a0c91e6bf6
729 </wsa:RelatesTo>
730 ...
731 </soap:Header>
732 <soap:Body>
733 ...
734 </soap:Body>
735 </soap:Envelope>
736
```

737

R3:

```
738 <soap:Envelope ...>
739 <soap:Header>
740 <wsa:From>
741 <wsa:Address>http://example.com/callback-other</wsa:Address>
742 <wsa:ReferenceProperties>
743 <myNS:SomeID>2</myNS:SomeID>
744 </wsa:ReferenceProperties>
745 </wsa:From>
746 <wsa:MessageID>urn:uuid:f81d4fae-9dec-11d0-a765-
747 00a0c91e6bf6</wsa:messageID>
748 ...
749 </soap:Header>
750 <soap:Body>
751 ...
752 </soap:Body>
753 </soap:Envelope>
```

756

757 **S4, S5:**

```
758 <soap:Envelope ...>
759 <soap:Header>
760 <wsa:To>http://example.com/callback-other</wsa:To>
761 <myNS:SomeID>2</myNS:SomeID>
762 <wsa:RelatesTo RelationshipType="http://docs.oasis-open.org/opencsa/sca-
763 bindings/ws/callback">urn:uuid:f81d4fae-9dec-11d0-a765-
764 00a0c91e6bf6</wsa:RelatesTo>
765 ...
766 </soap:Header>
767 <soap:Body>
768 ...
769 </soap:Body>
770 </soap:Envelope>
```

771

772 **E.1 Message Examples Using WS-MakeConnection**

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773 In this case the reference R cannot host a listener and uses WS-MakeConnection to poll
774 for callback requests. The interaction between the two consists of reference R sending a
775 forward request R4. When using HTTP, the HTTP response to R4 contains an empty
776 entity body. This is followed by a MakeConnection message from the reference to the
777 service. This is a polling message from the reference and establishes a connection. If the
778 callback request is ready when the connection is established, the service sends a
779 callback request S6 to the reference in the entity body of the HTTP response.

780 **R4:**

```
781 <soap:Envelope ...>
782 <soap:Header>
783 <wsa:From>
784 <wsa:Address>http://docs.oasis-open.org/ws-
785 rx/wsmc/200702/anonymous?id=650e8400-f29b-11d4-a716-446655440010</wsa:Address>
786 </wsa:From>
787 <wsa:MessageID>urn:uuid:f81d4fae-10dec-11d0-a765-
788 00a0c91e6bf6</wsa:messageID>
789 ...
790 </soap:Header>
791 <soap:Body>
792 ...
793 </soap:Body>
794 </soap:Envelope>
```

795

796 **MakeConnection polling message (from R to S):**

```
797 <soap:Envelope ...>
798 <soap:Header>
799 <wsa:Action>http://docs.oasis-open.org/ws-
800 rx/wsmc/200702/MakeConnection</wsa:Action>
801 ...
802 </soap:Header>
803 <soap:Body>
804 <wsmc:MakeConnection>
805 <wsmc:Address>http://docs.oasis-open.org/ws-
806 rx/wsmc/200702/anonymous?id=650e8400-f29b-11d4-a716-
807 446655440010</wsmc:Address>
808 </wsmc:MakeConnection>
809 </soap:Body>
810 </soap:Envelope>
```

811

812

S6:

```
813 <soap:Envelope ...>
814 <soap:Header>
815 <wsa:To>http://docs.oasis-open.org/ws-rx/wsmc/200702/anonymous?id=650e8400-
816 f29b-11d4-a716-446655440010</wsa:To>
817 <wsa:RelatesTo RelationshipType="http://docs.oasis-open.org/opencsa/sca-
818 bindings/ws/callback">urn:uuid:f81d4fae-10dec-11d0-a765-
819 00a0c91e6bf6</wsa:RelatesTo>
820 ...
821 </soap:Header>
822 <soap:Body>
823 ...
824 </soap:Body>
825 </soap:Envelope>
```

826

827

828

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829 **F. Acknowledgements**

830 The following individuals have participated in the creation of this specification and are gratefully acknowledged:

831 **Participants:**

832 [Participant Name, Affiliation | Individual Member]

833 [Participant Name, Affiliation | Individual Member]

834

G. Non-Normative Text

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836

H. Revision History

837 [optional; should not be included in OASIS Standards]

Revision	Date	Editor	Changes Made
1	2007-09-25	Anish Karmarkar	Applied the OASIS template + related changes to the Submission
2	2008-04-02	Anish Karmarkar	<ul style="list-style-type: none"> * Partially applied the resolution of issue 14 in the conformance section. * Applied resolution to issue 9. * Applied resolution to issue 15. * Applied resolution to issue 16. * Applied resolution to issue 10. * Applied resolution to issue 8. * Applied resolution to issue 3.
3	2008-06-12	Simon Holdsworth	<ul style="list-style-type: none"> * Completed application of resolution to issue 10 * Applied most of the editorial changes from Eric Johnson's review
4	2008-08-13	Anish Karmarkar	<ul style="list-style-type: none"> * Applied rest of Eric Johnson's ed review comments. * Applied resolution of issue 13. * Reapplied resolution of issue 15 (it was not applied correctly before) * Applied resolution of issue 19. * Applied resolution of issue 30. * Applied resolution of issue 32. * Applied resolution of issue 36. * Applied resolution of issue 38.
cd01-rev1	2008-10-16	Simon Holdsworth	Applied resolution of issue 41.
cd01-rev2	2008-10-20	Anish Karmarkar	Added rfc2119 statements.
cd01-rev3	2008-11-19	Anish Karmarkar	Incorporated feedback from Bryan, Eric & Dave
cd01-rev3	2008-12-02	Anish Karmarkar	Removed 'required' word associated with description of pseudo-schema + changed section 2.6 (wsdl extensibility) per the TC decision. Both of these were associated with issue 51 (2119 stmts)
cd01-rev5	2009-02-06	Simon Holdsworth	<ul style="list-style-type: none"> Applied resolution of issue 11 Applied resolution of issue 49 Applied action item 20080904-1
cd02	2009-02-16	Simon Holdsworth	Renamed, applied editorial issues

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