



SCA Policy Framework Version 1.1

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<http://docs.oasis-open.org/opencsa/sca-assembly/sca-assembly-1.1-spec-cd05.pdf>

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1 Introduction

The capture and expression of non-functional requirements is an important aspect of service definition and has an impact on SCA throughout the lifecycle of components and compositions. SCA provides a framework to support specification of constraints, capabilities and QoS expectations from component design through to concrete deployment. This specification describes the framework and its usage. Specifically, this section describes the SCA policy association framework that allows policies and policy subjects specified using [WS-Policy](#) [WS-Policy] and [WS-PolicyAttachment](#) [WS-PolicyAttach], as well as with other policy languages, to be associated with SCA components. This document should be read in conjunction with the [SCA Assembly Specification](#) [SCA-Assembly]. Details of policies for specific policy domains can be found in sections 7, 8 and 9.

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 [\[RFC2119\]](#).

1.2 XML Namespaces

Prefixes and Namespaces used in this Specification

Prefix	XML Namespace	Specification
sca	docs.oasis-open.org/ns/opencsa/sca/200912 This is assumed to be the default namespace in this specification. xs:QNames that appear without a prefix are from the SCA namespace.	[SCA-Assembly]
acme	Some namespace; a generic prefix	
wsp	http://www.w3.org/2006/07/ws-policy	[WS-Policy]
xs	http://www.w3.org/2001/XMLSchema	[XML Schema Datatypes]

Table 1-1: XML Namespaces and Prefixes

1.3 Normative References

- [RFC2119]** S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*, <http://www.ietf.org/rfc/rfc2119.txt>, IETF RFC 2119, March 1997.
- [SCA-Assembly]** OASIS Committee Draft 05, “Service Component Architecture Assembly Model Specification Version 1.1”, January 2010. <http://docs.oasis-open.org/opencsa/sca-assembly/sca-assembly-1.1-spec-cd05.pdf>
- [SCA-Java-Annotations]** OASIS Committee Draft 04, “SCA Java Common Annotations and APIs Specification Version 1.1”, February 2010.

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28		http://docs.oasis-open.org/opencsa/sca-j/sca-javacaa-1.1-spec-cd04.pdf
29	[SCA-WebServicesBinding]	
30		OASIS Committee Draft 03, "SCA Web Services Binding Specification Version
31		1.1", July 2009.
32		http://docs.oasis-open.org/opencsa/sca-bindings/sca-wsbinding-1.1-spec-
33		cd03.pdf
34	[WSDL]	Web Services Description Language (WSDL) Version 2.0 Part 1: Core Language
35		– Appendix http://www.w3.org/TR/2006/CR-wsdl20-20060327/
36	[WS-AtomicTransaction]	
37		OASIS Standard, "Web Services Atomic Transaction Version 1.2", February
38		2009.
39		http://docs.oasis-open.org/ws-tx/wsdl2006/06 .
40	[WSDL-Ids]	SCA WSDL 1.1 Element Identifiers – forthcoming W3C Note
41		http://dev.w3.org/cvsweb/~checkout~/2006/ws/policy/wsdl11elementidentifiers.ht
42		ml
43	[WS-Policy]	Web Services Policy (WS-Policy)
44		http://www.w3.org/TR/ws-policy
45	[WS-PolicyAttach]	Web Services Policy Attachment (WS-PolicyAttachment)
46		http://www.w3.org/TR/ws-policy-attach
47	[XPath]	XML Path Language (XPath) Version 1.0.
48		http://www.w3.org/TR/xpath
49	[XML-Schema2]	XML Schema Part 2: Datatypes Second Edition XML Schema Part 2: Datatypes
50		Second Edition, Oct. 28 2004.
51		http://www.w3.org/TR/xmlschema-2/

52 1.4 Naming Conventions

53 This specification follows some naming conventions for artifacts defined by the specification, as follows:

- 54 • For the names of elements and the names of attributes within XSD files, the names follow the
55 CamelCase convention, with all names starting with a lower case letter, e.g. <element
56 name="policySet" type="..."/>.
- 57 • For the names of types within XSD files, the names follow the CamelCase convention with all names
58 starting with an upper case letter, e.g. <complexType name="PolicySet">.
- 59 • For the names of intents, the names follow the CamelCase convention, with all names starting with a
60 lower case letter, EXCEPT for cases where the intent represents an established acronym, in which
61 case the entire name is in upper case. An example of an intent which is an acronym is the "SOAP"
62 intent.

63 2 Overview

64 2.1 Policies and PolicySets

65 The term **Policy** is used to describe some capability or constraint that can be applied to service
66 components or to the interactions between service components represented by services and references.
67 An example of a policy is that messages exchanged between a service client and a service provider have
68 to be encrypted, so that the exchange is confidential and cannot be read by someone who intercepts the
69 messages.

70 In SCA, services and references can have policies applied to them that affect the form of the interaction
71 that takes place at runtime. These are called **interaction policies**.

72 Service components can also have other policies applied to them, which affect how the components
73 themselves behave within their runtime container. These are called **implementation policies**.

74 How particular policies are provided varies depending on the type of runtime container for implementation
75 policies and on the binding type for interaction policies. Some policies can be provided as an inherent part
76 of the container or of the binding – for example a binding using the https protocol will always provide
77 encryption of the messages flowing between a reference and a service. Other policies can optionally be
78 provided by a container or by a binding. It is also possible that some kinds of container or kinds of binding
79 are incapable of providing a particular policy at all.

80 In SCA, policies are held in **policySets**, which can contain one or many policies, expressed in some
81 concrete form, such as WS-Policy assertions. Each policySet targets a specific binding type or a specific
82 implementation type. PolicySets are used to apply particular policies to a component or to the binding of a
83 service or reference, through configuration information attached to a component or attached to a
84 composite.

85 For example, a service can have a policy applied that requires all interactions (messages) with the service
86 to be encrypted. A reference which is wired to that service needs to support sending and receiving
87 messages using the specified encryption technology if it is going to use the service successfully.

88 In summary, a service presents a set of interaction policies, which it requires the references to use. In
89 turn, each reference has a set of policies, which define how it is capable of interacting with any service to
90 which it is wired. An implementation or component can describe its requirements through a set of
91 attached implementation policies.

92 2.2 Intents describe the requirements of Components, Services and 93 References

94 SCA **intents** are used to describe the abstract policy requirements of a component or the requirements of
95 interactions between components represented by services and references. Intents provide a means for
96 the developer and the assembler to state these requirements in a high-level abstract form, independent of
97 the detailed configuration of the runtime and bindings, which involve the role of application deployer.
98 Intents support late binding of services and references to particular SCA bindings, since they assist the
99 deployer in choosing appropriate bindings and concrete policies which satisfy the abstract requirements
100 expressed by the intents.

101 It is possible in SCA to attach policies to a service, to a reference or to a component at any time during
102 the creation of an assembly, through the configuration of bindings and the attachment of policy sets.
103 Attachment can be done by the developer of a component at the time when the component is written or it
104 can be done later by the deployer at deployment time. SCA recommends a late binding model where the
105 bindings and the concrete policies for a particular assembly are decided at deployment time.

106 SCA favors the late binding approach since it promotes re-use of components. It allows the use of
107 components in new application contexts, which might require the use of different bindings and different

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108 concrete policies. Forcing early decisions on which bindings and policies to use is likely to limit re-use and
109 limit the ability to use a component in a new context.

110 For example, in the case of authentication, a service which requires the client to be authenticated can be
111 marked with an intent called "**clientAuthentication**". This intent marks the service as requiring the client
112 to be authenticated without being prescriptive about how it is achieved. At deployment time, when a
113 binding is chosen for the service (say SOAP over HTTP), the deployer can apply suitable policies to the
114 service which provide aspects of WS-Security and which supply a group of one or more authentication
115 technologies.

116 In many ways, intents can be seen as restricting choices at deployment time. If a service is marked with
117 the **confidentiality** intent, then the deployer has to use a binding and a policySet that provides for the
118 encryption of the messages.

119 The set of intents available to developers and assemblers can be extended by policy administrators. The
120 SCA Policy Framework specification does define a set of intents which address the infrastructure
121 capabilities relating to security, transactions and reliable messaging.

122 **2.3 Determining which policies apply to a particular wire**

123 Multiple policies can be attached to both services and to references. Where there are multiple policies,
124 they can be organized into policy domains, where each domain deals with some particular aspect of the
125 interaction. An example of a policy domain is confidentiality, which covers the encryption of messages
126 sent between a reference and a service. Each policy domain can have one or more policy. Where
127 multiple policies are present for a particular domain, they represent alternative ways of meeting the
128 requirements for that domain. For example, in the case of message integrity, there could be a set of
129 policies, where each one deals with a particular security token to be used: e.g. X509, SAML, Kerberos.
130 Any one of the tokens can be used - they will all ensure that the overall goal of message integrity is
131 achieved.

132 In order for a service to be accessed by a wide range of clients, it is good practice for the service to
133 support multiple alternative policies within a particular domain. So, if a service requires message
134 confidentiality, instead of insisting on one specific encryption technology, the service can have a policySet
135 which has a number of alternative encryption technologies, any of which are acceptable to the service.
136 Equally, a reference can have a policySet attached which defines the range of encryption technologies
137 which it is capable of using. Typically, the set of policies used for a given domain will reflect the
138 capabilities of the binding and of the runtime being used for the service and for the reference.

139 When a service and a reference are wired together, the policies declared by the policySets at each end of
140 the wire are matched to each other. SCA does not define how policy matching is done, but instead
141 delegates this to the policy language (e.g. WS-Policy) used for the binding. For example, where WS-
142 Policy is used as the policy language, the matching procedure looks at each domain in turn within the
143 policy sets and looks for 1 or more policies which are in common between the service and the reference.
144 When only one match is found, the matching policy is used. Where multiple matches are found, then the
145 SCA runtime can choose to use any one of the matching policies. No match implies that the configuration
146 is not valid and the deployer needs to take an action.

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147 3 Framework Model

148 The SCA Policy Framework model is comprised of *intents* and *policySets*. Intents represent abstract
149 assertions and Policy Sets contain concrete policies that can be applied to SCA bindings and
150 implementations. The framework describes how intents are related to policySets. It also describes how
151 intents and policySets are utilized to express the constraints that govern the behavior of SCA bindings
152 and implementations. Both intents and policySets can be used to specify QoS requirements on services
153 and references.

154 The following section describes the Framework Model and illustrates it using Interaction Policies.
155 Implementation Policies follow the same basic model and are discussed later in section 1.5.

156 3.1 Intents

157 As discussed earlier, an *intent* is an abstract assertion about a specific Quality of Service (QoS)
158 characteristic that is expressed independently of any particular implementation technology. An intent is
159 thus used to describe the desired runtime characteristics of an SCA construct. Typically, intents are
160 defined by a policy administrator. See section [Policy Administrator] for a more detailed description of
161 SCA roles with respect to Policy concepts, their definition and their use. The semantics of an intent can
162 not always be available normatively, but could be expressed with documentation that is available and
163 accessible.

164 For example, an intent named *integrity* can be specified to signify that communications need to be
165 protected from possible tampering. This specific intent can be declared as a requirement by some SCA
166 artifacts, e.g. a reference. Note that this intent can be satisfied by a variety of bindings and with many
167 different ways of configuring those bindings. Thus, the reference where the intent is expressed as a
168 requirement could eventually be wired using either a web service binding (SOAP over HTTP) or with an
169 EJB binding that communicates with an EJB via RMI/IIOP.

170 Intents can be used to express requirements for *interaction policies* or *implementation policies*. The
171 *integrity* intent in the above example is used to express a requirement for an interaction policy.
172 Interaction policies are, typically, applied to a *service* or *reference*. They are meant to govern the
173 communication between a client and a service provider. Intents can also be applied to SCA component
174 implementations as requirements for *implementation policies*. These intents specify the qualities of
175 service that need to be provided by a container as it runs the component. An example of such an intent
176 could be a requirement that the component needs to run in a transaction.

177 If the configured instance of a binding is in conflict with the intents and policy sets selected for that
178 instance, the SCA runtime MUST raise an error. [POL30001]. For example, a web service binding which
179 requires the SOAP intent but which points to a WSDL binding that does not specify SOAP.

180 For convenience and conciseness, it is often desirable to declare a single, higher-level intent to denote a
181 requirement that could be satisfied by one of a number of lower-level intents. For example, the
182 *confidentiality* intent requires either message-level encryption or transport-level encryption.

183 Both of these are abstract intents because the representation of the configuration necessary to realize
184 these two kinds of encryption could vary from binding to binding, and each would also require additional
185 parameters for configuration.

186 An intent that can be completely satisfied by one of a choice of lower-level intents is
187 referred to as a *qualifiable intent*. In order to express such intents, the intent name can
188 contain a qualifier: a "." followed by a *xs:string* name. An intent name that includes a
189 qualifier in its name is referred to as a *qualified intent*, because it is "qualifying" how the
190 qualifiable intent is satisfied. A qualified intent can only qualify one qualifiable intent, so the
191 name of the qualified intent includes the name of the qualifiable intent as a prefix, for
192 example, *clientAuthentication.message*.

193 In general, SCA allows the developer or assembler to attach multiple qualifiers for a single

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194 qualifiable intent to the same SCA construct. However, domain-specific constraints can prevent the use of
195 some combinations of qualifiers (from the same qualifiable intent).

196 Intents, their qualifiers and their defaults are defined using the pseudo schema in Snippet 3-1:
197

```
198 <intent name="xs:NCName"  
199     constrains="sca:listOfQNames" ?  
200     requires="sca:listOfQNames" ?  
201     excludes="sca:listOfQNames" ?  
202     mutuallyExclusive="xs:boolean" ?  
203     intentType="xs:string" ? >  
204     <description> xs:string.</description?>  
205     <qualifier name="xs:string" default="xs:boolean" ?> *  
206         <description> xs:string.</description?>  
207     </qualifier>  
208 </intent>
```

209 Snippet 3-1: intent Pseudo-Schema
210

211 Where the intent element has the following attributes:

- 212 • @name (1..1) - an NCName that defines the name of the intent. **The QName for an intent MUST be**
213 **unique amongst the set of intents in the SCA Domain.** [POL30002]
- 214 • @constrains (0..1) - a list of QNames that specifies the SCA constructs that this intent is meant to
215 configure. If a value is not specified for this attribute then the intent can apply to any SCA element.
216 Note that the "constrains" attribute can name an abstract element type, such as sca:binding in our
217 running example. This means that it will match against any binding used within an SCA composite
218 file. An SCA element can match @constrains if its type is in a substitution group.
- 219 • @requires (0..1) - contains a list of QNames of intents which defines the set of all intents that the
220 referring intent requires. In essence, the referring intent requires all the intents named to be satisfied.
221 This attribute is used to compose an intent from a set of other intents. **Each QName in the @requires**
222 **attribute MUST be the QName of an intent in the SCA Domain.** [POL30015] This use is further
223 described in [Profile Intents](#).
- 224 • @excludes (0..1) - a list of QNames of intents that cannot be used with this intent. Intents might
225 describe a policy that is incompatible or otherwise unrealizable when specified with other intents, and
226 therefore are considered to be mutually exclusive. **Each QName in the @excludes attribute MUST be**
227 **the QName of an intent in the SCA Domain.** [POL30016]

228 Two intents are mutually exclusive when any of the following are true:

- 229 – One of the two intents lists the other intent in its @excludes list.
- 230 – Both intents list the other intent in their respective @excludes list.

231 Where one intent is attached to an element of an SCA composite and another intent is attached to
232 one of the element's parents, the intent(s) that are effectively attached to the element differs
233 depending on whether the two intents are mutually exclusive (see @excludes above and "Attaching
234 intents to SCA elements").

- 235 • @mutuallyExclusive (0..1) - a boolean with a default of "false". If this attribute is present and has a
236 value of "true" it indicates that the qualified intents defined for this intent are mutually exclusive.
- 237 • @intentType attribute (0..1) defines whether the intent is an interaction intent or an implementation
238 intent. A value of "interaction", which is the default value, indicates that the intent is an interaction
239 intent. A value of "implementation" indicates that the intent is an implementation intent.

240 One or more <qualifier> child elements can be used to define qualifiers for the intent. The attributes of
241 the qualifier element are:

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- 242 • @name (1..1) - declares the name of the qualifier. The name of each qualifier MUST be unique within
243 the intent definition. [POL30005].
- 244 • @default (0..1) - a boolean value with a default value of "false". If @default="true" the particular
245 qualifier is the default qualifier for the intent. If an intent has more than one qualifier, one and only
246 one MUST be declared as the default qualifier. [POL30004]. If only one qualifier for an intent is given
247 it MUST be used as the default qualifier for the intent. [POL30025]
- 248 • qualifier/description (0..1) - an xs:string that holds a textual description of the qualifier.

249 For example, the **confidentiality** intent which has qualified intents called
250 **confidentiality.transport** and **confidentiality.message** can be defined as:

251

```
252 <intent name="confidentiality" constrains="sca:binding">  
253   <description>  
254     Communication through this binding must prevent  
255     unauthorized users from reading the messages.  
256   </description>  
257   <qualifier name="transport">  
258     <description>Automatic encryption by transport  
259   </description>  
260 </qualifier>  
261   <qualifier name="message" default='true'>  
262     <description>Encryption applied to each message  
263   </description>  
264 </qualifier>  
265 </intent>
```

266 *Snippet 3-2: Example intent Definition*

267

268 An Intent can be contributed to the SCA Domain by including its definition in a definitions.xml file within a
269 Contribution in the Domain. Details of the definitions.xml files are described in the [SCA Assembly Model](#)
270 [SCA-Assembly].

271 SCA normatively defines a set of core intents that all SCA implementations are expected to support, to
272 ensure a minimum level of portability. Users of SCA can define new intents, or extend the qualifier set of
273 existing intents. An SCA Runtime MUST include in the Domain the set of intent definitions contained in
274 the Policy_Intents_Definitions.xml described in the appendix "Intent Definitions" of the SCA Policy
275 specification. [POL30024] It is also good practice for the Domain to include concrete policies which satisfy
276 these intents (this may be achieved through the provision of appropriate binding types and
277 implementation types, augmented by policy sets that apply to those binding types and implementation
278 types).

279 The normatively defined intents in the SCA specification might evolve in future versions of this
280 specification. New intents could be added, additional qualifiers could be added to existing intents and the
281 default qualifier for existing intents could change. Such changes would cause the namespace for the SCA
282 specification to change.

283 3.2 Interaction Intents and Implementation Intents

284 An interaction intent is an intent designed to influence policy which applies to a service, a reference and
285 the wires that connect them. Interaction intents affect wire matching between the two ends of a wire
286 and/or the set of bytes that flow between the reference and the service when a service invocation takes
287 place.

288 Interaction intents typically apply to <binding/> elements.

289 An implementation intent is an intent designed to influence policy which applies to an implementation
290 artifact or to the relationship of that artifact to the runtime code which is used to execute the artifact.
291 Implementation intents do not affect wire matching between references and services, nor do they affect
292 the bytes that flow between a reference and a service.

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293 Implementation intents often apply to <implementation/> elements, but they can also apply to <binding/>
294 elements, where the desire is to influence the activity of the binding implementation code and how it
295 interacts with the remainder of the runtime code for the implementation.
296 Interaction intents and implementation intents are distinguished by the value of the @intentType attribute
297 in the intent definition.

298 3.3 Profile Intents

299 An intent that is satisfied only by satisfying *all* of a set of other intents is called a **profile intent**. It can be
300 used in the same way as any other intent.

301 The presence of @requires attribute in the intent definition signifies that this is a profile intent. The
302 @requires attribute can include all kinds of intents, including qualified intents and other profile intents.
303 However, while a profile intent can include qualified intents, it cannot be a qualified intent. Thus, **the**
304 **name of a profile intent MUST NOT have a "." in it.** [POL30006]

305 Requiring a profile intent is semantically identical to requiring the list of intents that are listed in its
306 @requires attribute. **If a profile intent is attached to an artifact, all the intents listed in its @requires**
307 **attribute MUST be satisfied as described in section 4.15.** [POL30007]

308 An example of a profile intent is an intent called **messageProtection** which is a shortcut for specifying
309 both **confidentiality** and **integrity**, where **integrity** means to protect against modification, usually by
310 signing. The intent definition is shown in Snippet 3-3:

```
311  
312 <intent name="messageProtection"  
313   constrains="sca:binding"  
314   requires="sca:confidentiality sca:integrity">  
315   <description>  
316     Protect messages from unauthorized reading or modification.  
317   </description>  
318 </intent>
```

319 *Snippet 3-3: Example Profile Intent*

320 3.4 PolicySets

321 A **policySet** element is used to define a set of concrete policies that apply to some binding type or
322 implementation type, and which correspond to a set of intents provided by the policySet.

323 The pseudo schema for policySet is shown in Snippet 3-4:

```
324  
325 <policySet name="xs:NCName"  
326   provides="sca:listOfQNames"?  
327   appliesTo="xs:string"?  
328   attachTo="xs:string"?  
329   xmlns=http://docs.oasis-open.org/ns/opencsa/sca/200912  
330   xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy">  
331   <policySetReference name="xs:QName" /*>  
332   <intentMap/>*</policySetReference>  
333   <x:any>*</x:any>  
334 </policySet>
```

335 *Snippet 3-4: policySet Pseudo-Schema*

336

337 PolicySet has the attributes:

- 338 • @name (1..1) - the name for the policySet. The value of the @name attribute is the local part of a
339 QName. **The QName for a policySet MUST be unique amongst the set of policySets in the SCA**
340 **Domain.** [POL30017]

- 341 • @appliesTo (0..1) - a string which is an XPath 1.0 expression identifying one or more SCA constructs
342 this policySet can configure. **The contents of @appliesTo MUST match the XPath 1.0 [XPATH]
343 production Expr. [POL30018]** The @appliesTo attribute uses the "Deployed Composites Infoset" as
344 described in Appendix A: The Deployed Composites Infoset section.
- 345 • @attachTo (0..1) - a string which is an XPath 1.0 expression identifying one or more elements in the
346 Domain. It is used to declare which set of elements the policySet is actually attached to. **The
347 contents of @attachTo MUST match the XPath 1.0 production Expr. [POL30019]** The XPath value of
348 the @attachTo attribute is evaluated against the "Deployed Composite Infoset" as described in
349 Appendix A: Defining the Deployed Composites Infoset. See the section on "**Attaching Intents and
350 PolicySets to SCA Constructs**" for more details on how this attribute is used.
- 351 • @provides (0..1) - a list of intent QNames (that can be qualified), which declares the intents the
352 PolicySet provides.

353 PolicySet contains one or more of the element children

- 354 • intentMap element
- 355 • policySetReference element
- 356 • xs:any extensibility element

357 Any mix of the above types of elements, in any number, can be included as children of the policySet
358 element including extensibility elements. There are likely to be many different policy languages for
359 specific binding technologies and domains. In order to allow the inclusion of any policy language within a
360 policySet, the extensibility elements can be from any namespace and can be intermixed.

361 The SCA policy framework expects that **WS-Policy** will be a common policy language for expressing
362 interaction policies, especially for Web Service bindings. Thus a common usecase is to attach WS-
363 Policies directly as children of <policySet> elements; either directly as <wsp:Policy> elements, or as
364 <wsp:PolicyReference> elements or using <wsp:PolicyAttachment>. These three elements, and others,
365 can be attached using the extensibility point provided by the <xs:any> in the pseudo schema above. See
366 example below.

367 For example, the policySet element below declares that it provides
368 **serverAuthentication.message** and **reliability** for the "binding.ws" SCA binding.

```
369 <policySet name="SecureReliablePolicy"
370   provides="serverAuthentication.message exactlyOne"
371   appliesTo="//sca:binding.ws"
372   xmlns="http://docs.oasis-open.org/ns/opencsa/sca/200912"
373   xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy">
374   <wsp:PolicyAttachment>
375     <!-- policy expression and policy subject for
376        "basic server authentication" -->
377     ...
378   </wsp:PolicyAttachment>
379   <wsp:PolicyAttachment>
380     <!-- policy expression and policy subject for
381        "reliability" -->
382     ...
383   </wsp:PolicyAttachment>
384 </policySet>
```

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386 *Snippet 3-5: Example policySet Definition*

387
388 PolicySet authors need to be aware of the evaluation of the @appliesTo attribute in order to designate
389 meaningful values for this attribute. Although policySets can be attached to any element in an SCA
390 composite, the applicability of a policySet is not scoped by where it is attached in the SCA framework.
391 Rather, policySets always apply to either binding instances or implementation elements regardless of

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392 where they are attached. In this regard, the SCA policy framework does not scope the applicability of the
393 policySet to a specific attachment point in contrast to other frameworks, such as WS-Policy.

394 When computing the policySets that apply to a particular element, the @appliesTo attribute of each
395 relevant policySet is checked against the element. If a policySet that is attached to an ancestor element
396 does not apply to the element in question, it is simply discarded.

397 With this design principle in mind, an XPath expression that is the value of an @appliesTo attribute
398 designates what a policySet applies to. Note that the XPath expression will always be evaluated against
399 the Domain Composite Infoset as described in Section 4.4.1 "The Form of the @attachTo Attribute". The
400 policySet will apply to any child binding or implementation elements returned from the expression. So, for
401 example, appliesTo="//binding.ws" will match any web service binding. If
402 appliesTo="//binding.ws[@impl='axis']" then the policySet would apply only to web service bindings that
403 have an @impl attribute with a value of 'axis'.

404 When writing policySets, the author needs to ensure that the policies contained in the policySet always
405 satisfy the intents in the @provides attribute. Specifically, when using [WS-Policy](#) the optional attribute
406 and the exactlyOne operator can result in alternative policies and uncertainty as to whether a particular
407 alternative satisfies the advertised intents.

408 If the WS-Policy attribute optional = 'true' is attached to a policy assertion, it results in two policy
409 alternatives, one that includes and one that does not include the assertion. During wire validation it is
410 impossible to predict which of the two alternatives will be selected -if the absence of the policy assertion
411 does not satisfy the intent, then it is possible that the intent is not actually satisfied when the policySet is
412 used.

413 Similarly, if the WS-Policy operator exactlyOne is used, only one of the set of policy assertions within the
414 operator is actually used at runtime. If the set of assertions is intended to satisfy one or more intents, it is
415 vital to ensure that each policy assertion in the set actually satisfies the intent(s).

416 Note that section 4.12.1 on Wire Validity specifies that the strict version of the WS-Policy intersection
417 algorithm is used to establish wire validity and determine the policies to be used. The strict version of
418 policy intersection algorithm ignores the ignorable attribute on assertions. This means that the ignorable
419 facility of WS-Policy cannot be used in policySets.

420 For further discussion on attachment of policySets and the computation of applicable policySets, please
421 refer to [Section 4](#).

422 A policySet can be contributed to the SCA Domain by including its definition in a definitions.xml file within
423 a Contribution in the Domain. Details of the definitions.xml files are described in the [SCA Assembly Model](#)
424 [SCA-Assembly].

425 3.4.1 IntentMaps

426 Intent maps contain the concrete policies and policy subjects that are used to realize a specific intent that
427 is provided by the policySet.

428 The pseudo-schema for intentMaps is given in Snippet 3-6:

429

```
430 <intentMap provides="xs:QName" >  
431   <qualifier name="xs:string" >?  
432     <xs:any>*</xs:any>  
433   </qualifier>  
434 </intentMap>
```

435 *Snippet 3-6: intentMap Pseudo-Schema*

436

437 When a policySet element contains a set of intentMap children, the value of the @provides attribute of
438 each intentMap MUST correspond to an unqualified intent that is listed within the @provides attribute
439 value of the parent policySet element. [POL30008]

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440 If a policySet specifies a qualifiable intent in the @provides attribute, and it provides an intentMap for the
441 qualifiable intent then that intentMap MUST specify all possible qualifiers for that intent. [POL30020]

442 For each qualifiable intent listed as a member of the @provides attribute list of a policySet element, there
443 MUST be no more than one corresponding intentMap element that declares the unqualified form of that
444 intent in its @provides attribute. In other words, each intentMap within a given policySet uniquely provides
445 for a specific intent. [POL30010]

446 The @provides attribute value of each intentMap that is an immediate child of a policySet MUST be
447 included in the @provides attribute of the parent policySet. [POL30021]

448 An intentMap element contains qualifier element children. Each qualifier element corresponds to a
449 qualified intent where the unqualified form of that intent is the value of the @provides attribute value of
450 the parent intentMap. The qualified intent is either included explicitly in the value of the enclosing
451 policySet's @provides attribute or implicitly by that @provides attribute including the unqualified form of
452 the intent.

453 A qualifier element designates a set of concrete policy attachments that correspond to a qualified intent.
454 The concrete policy attachments can be specified using wsp:PolicyAttachment element children or using
455 extensibility elements specific to an environment.

456 As an example, the policySet element in Snippet 3-7 declares that it provides **confidentiality** using the
457 @provides attribute. The alternatives (transport and message) it contains each specify the policy and
458 policy subject they provide. The default is "transport".

```
459  
460 <policySet name="SecureMessagingPolicies"  
461   provides="confidentiality"  
462   appliesTo="//binding.ws"  
463   xmlns="http://docs.oasis-open.org/ns/opencsa/sca/200912"  
464   xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy">  
465   <intentMap provides="confidentiality" >  
466     <qualifier name="transport" >  
467       <wsp:PolicyAttachment>  
468         <!-- policy expression and policy subject for  
469           "transport" alternative -->  
470         ...  
471       </wsp:PolicyAttachment>  
472       <wsp:PolicyAttachment>  
473         ...  
474       </wsp:PolicyAttachment>  
475     </qualifier>  
476     <qualifier name="message">  
477       <wsp:PolicyAttachment>  
478         <!-- policy expression and policy subject for  
479           "message" alternative -->  
480         ...  
481       </wsp:PolicyAttachment>  
482     </qualifier>  
483   </intentMap>  
484 </policySet>
```

485 *Snippet 3-7: Example policySet with an intentMap*

486
487 PolicySets can embed policies that are defined in any policy language. Although WS-Policy is the most
488 common language for expressing interaction policies, it is possible to use other policy languages Snippet
489 3-8 is an example of a policySet that embeds a policy defined in a proprietary language. This policy
490 provides "serverAuthentication" for binding.ws.

```
491  
492 <policySet name="AuthenticationPolicy"  
493   provides="serverAuthentication"  
494   appliesTo="//binding.ws"
```

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```
495     xmlns="http://docs.oasis-open.org/ns/opencsa/sca/200912">
496     <e:policyConfiguration xmlns:e="http://example.com">
497       <e:authentication type = "X509"/>
498       <e:trustedCAStore type="JKS"/>
499       <e:keyStoreFile>Foo.jks</e:keyStoreFile>
500       <e:keyStorePassword>123</e:keyStorePassword>
501     </e:authentication>
502   </e:policyConfiguration>
503 </policySet>
```

504 *Snippet 3-8: Example policySet Using a Proprietary Language*

505 3.4.2 Direct Inclusion of Policies within PolicySets

506 In cases where there is no need for defaults or overriding for an intent included in the @provides of a
507 policySet, the policySet element can contain policies or policy attachment elements directly without the
508 use of intentMaps or policy set references. There are two ways of including policies directly within a
509 policySet. Either the policySet contains one or more wsp:policyAttachment elements directly as children
510 or it contains extension elements (using xs:any) that contain concrete policies.

511 **Following the inclusion of all policySet references, when a policySet element directly contains**
512 **wsp:policyAttachment children or policies using extension elements, the set of policies specified as**
513 **children MUST satisfy all the intents expressed using the @provides attribute value of the policySet**
514 **element. [POL30011]** The intent names in the @provides attribute of the policySet can include names of
515 profile intents.

516 3.4.3 Policy Set References

517 A policySet can refer to other policySets by using sca:PolicySetReference element. This provides a
518 recursive inclusion capability for intentMaps, policy attachments or other specific mappings from different
519 domains.

520 When a policySet element contains policySetReference element children, the @name attribute of a
521 policySetReference element designates a policySet defined with the same value for its @name attribute.
522 Therefore, the @name attribute is a QName.

523 **The set of intents in the @provides attribute of a referenced policySet MUST be a subset of the set of**
524 **intents in the @provides attribute of the referencing policySet. [POL30013]** Qualified intents are a subset
525 of their parent qualifiable intent.

526 The usage of a policySetReference element indicates a copy of the element content children of the
527 policySet that is being referred is included within the referring policySet. If the result of inclusion results in
528 a reference to another policySet, the inclusion step is repeated until the contents of a policySet does not
529 contain any references to other policySets.

530 When a policySet is applied to a particular element, the policies in the policy set
531 include any standalone policies plus the policies from each intent map contained in the
532 PolicySet, as described below.

533 Note that, since the attributes of a referenced policySet are effectively removed/ignored by this process, it
534 is the responsibility of the author of the referring policySet to include any necessary intents in the
535 @provides attribute of the policySet making the reference so that the policySet correctly advertises its
536 aggregate policy.

537 The default values when using this aggregate policySet come from the defaults in the included policySets.
538 A single intent (or all qualified intents that comprise an intent) in a referencing policySet ought to be
539 included once by using references to other policySets.

540 Snippet 3-9 is an example to illustrate the inclusion of two other policySets in a policySet element:

```
541  
542 <policySet name="BasicAuthMsgProtSecurity"  
543   provides="serverAuthentication confidentiality"
```

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```

544     appliesTo="//binding.ws"
545     xmlns="http://docs.oasis-open.org/ns/opencsa/sca/200912">
546     <policySetReference name="acme:ServerAuthenticationPolicies"/>
547     <policySetReference name="acme:ConfidentialityPolicies"/>
548 </policySet>

```

549 *Snippet 3-9: Example policySet Including Other policySets*

550
551 The policySet in Snippet 3-9 refers to policySets for **serverAuthentication** and
552 **confidentiality** and, by reference, provides policies and policy subject alternatives in these
553 domains.

554 If the policySets referred to in Snippet 3-9 have the following content:

```

555
556 <policySet name="ServerAuthenticationPolicies"
557     provides="serverAuthentication"
558     appliesTo="//binding.ws"
559     xmlns="http://docs.oasis-open.org/ns/opencsa/sca/200912">
560     <wsp:PolicyAttachment>
561     <!-- policy expression and policy subject for
562     "basic server authentication" -->
563     ...
564     </wsp:PolicyAttachment>
565 </policySet>
566
567 <policySet name="acme:ConfidentialityPolicies"
568     provides="confidentiality"
569     bindings="binding.ws"
570     xmlns="http://docs.oasis-open.org/ns/opencsa/sca/200912">
571     <intentMap provides="confidentiality" >
572     <qualifier name="transport">
573     <wsp:PolicyAttachment>
574     <!-- policy expression and policy subject for
575     "transport" alternative -->
576     ...
577     </wsp:PolicyAttachment>
578     <wsp:PolicyAttachment>
579     ...
580     </wsp:PolicyAttachment>
581     </qualifier>
582     <qualifier name="message">
583     <wsp:PolicyAttachment>
584     <!-- policy expression and policy subject for
585     "message" alternative -->
586     ...
587     </wsp:PolicyAttachment>
588     </qualifier>
589     </intentMap>
590 </policySet>

```

591 *Snippet 3-10: Example Included policySets for Snippet 3-9*

592
593 The result of the inclusion of policySets via policySetReferences would be semantically
594 equivalent to Snippet 3-11.

```

595
596 <policySet name="BasicAuthMsgProtSecurity"
597     provides="serverAuthentication confidentiality" appliesTo="//binding.ws"
598     xmlns="http://docs.oasis-open.org/ns/opencsa/sca/200912">
599     <wsp:PolicyAttachment>

```

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```
600 <!-- policy expression and policy subject for
601 "basic server authentication" -->
602 ...
603 </wsp:PolicyAttachment>
604 <intentMap provides="confidentiality" >
605 <qualifier name="transport">
606 <wsp:PolicyAttachment>
607 <!-- policy expression and policy subject for
608 "transport" alternative -->
609 ...
610 </wsp:PolicyAttachment>
611 <wsp:PolicyAttachment>
612 ...
613 </wsp:PolicyAttachment>
614 </qualifier>
615 <qualifier name="message">
616 <wsp:PolicyAttachment>
617 <!-- policy expression and policy subject for
618 "message" alternative -->
619 ...
620 </wsp:PolicyAttachment>
621 </qualifier>
622 </intentMap>
623 </policySet>
```

624 *Snippet 3-11: Equivalent policySet*

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625 4 Attaching Intents and PolicySets to SCA Constructs

626 This section describes how intents and policySets are associated with SCA constructs. It describes the
627 various attachment points and semantics for intents and policySets and their relationship to other SCA
628 elements and how intents relate to policySets in these contexts.

629 4.1 Attachment Rules – Intents

630 One or more intents can be attached to any SCA element used in the definition of components and
631 composites. The attachment can be specified by using the following two mechanisms:

- 632 • **Direct Attachment** mechanism which is described in the section "Direct Attachment of Intents".
- 633 • **External Attachment** mechanism which is described in the section "External Attachment of
634 Intents".

635 4.2 Direct Attachment of Intents

636 Intents can be attached to any SCA element used in the definition of components and composites.
637 Intents are attached by using the **@requires** attribute or the <requires> child element. The @requires
638 attribute takes as its value a list of intent names. Similarly, the <requires> element takes as its value a list
639 of intent names. Intents can also be attached to interface definitions. For WSDL portType elements
640 (WSDL 1.1) the @requires attribute can be used to attach the list of intents that are needed by the
641 interface. Other interface languages can define their own mechanism for attaching a list of intents. **Any**
642 **intents attached to an interface definition artifact, such as a WSDL portType, MUST be added to the**
643 **intents attached to the service or reference to which the interface definition applies. If no intents are**
644 **attached to the service or reference then the intents attached to the interface definition artifact become**
645 **the only intents attached to the service or reference.** [POL40027]

646 Because intents specified on interfaces can be seen by both the provider and the client of a service, it
647 is appropriate to use them to specify characteristics of the service that both the developers of provider and
648 the client need to know.

649 For example:

650

```
651 <service requires="acme:IntentName1 acme:IntentName2">  
652   <binding.xxx/>  
653   ...  
654 </service>  
655  
656 <reference requires="acme:IntentName1 acme:IntentName2">  
657   <binding.xxx/>  
658   ...  
659 </reference>
```

660 *Snippet 4-1: Example of @requires on a service or a reference*

```
661 <service>  
662   <requires intents="acme:IntentName1 acme:IntentName2"/>  
663   <binding.xxx/>  
664   ...  
665 </service>  
666  
667 <reference>  
668   <requires intents="acme:IntentName1 acme:IntentName2"/>  
669   <binding.xxx/>  
670   ...  
671 </reference>
```

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672 Snippet 4-2: Example of a <requires> subelement to attach intents to a service or a reference

673 4.3 External Attachment of Intents and PolicySets

674 External Attachment of intents and policySets is used for deployment-time application of intents and
675 policySets to SCA elements. It is called "external attachment" because the principle of the mechanism is
676 that the attachment is declared in a place that is separate from the composite files that contain the
677 elements. This separation provides the deployer with a way to attach intents and/or policySets without
678 having to modify the artifacts where the intents and policySets are attached.

679 Intents and policySets can be attached to one or more SCA elements by using the externalAttachment
680 element, which is declared within a definitions file.

681 The pseudo-schema for the externalAttachment element is shown in Snippet 4-3.

682

```
683 | <externalAttachment intents="sca:listOfQNames"  
684 | policySets="sca:listOfQNames"  
685 | attachTo="xs:string" />
```

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686 Snippet 4-3: Pseudo-schema for externalAttachment element

687

688 The **externalAttachment** element has the **attributes**:

- 689 • **@intents : listOfQNames (0..1)** A list of QNames identifying intents which are attached to the
690 elements declared in the @attachTo attribute.
- 691 • **@policySets : listOfQNames (0..1)** A list of QNames identifying policySets which are attached to
692 the elements declared in the @attachTo attribute
- 693 • **@attachTo : string (1..1)** A string containing an XPath 1.0 expression identifying one or more
694 elements in the Domain. It is used to declare which set of elements the intents are attached to.
695 The contents of the @attachTo attribute of an externalAttachment element MUST match the XPath
696 1.0 production Expr. [POL40035] The XPath value of the @attachTo attribute is evaluated against the
697 "Deployed Composite Infoset" as described in the appendix section "The Deployed Composites
698 Infoset".
699

700 4.4 Attachment Rules - PolicySets

701 One or more policySets can be attached to any SCA element used in the definition of components and
702 composites. The attachment can be specified by using the following two mechanisms:

- 703 • **Direct Attachment** mechanism which is described in [Direct Attachment of PolicySets](#).
 - 704 • **External Attachment** mechanism which is described in [External Attachment of PolicySets](#).
- 705 SCA runtimes MUST support at least one of the Direct Attachment and External Attachment mechanisms
706 for policySet attachment. [POL40010] SCA implementations supporting only the External Attachment
707 mechanism MUST ignore the policy sets that are applicable via the Direct Attachment mechanism.
708 [POL40011] SCA implementations supporting only the Direct Attachment mechanism MUST ignore the
709 policy sets that are applicable via the External Attachment mechanism. [POL40012] SCA
710 implementations supporting both Direct Attachment and External Attachment mechanisms MUST ignore
711 policy sets applicable to any given SCA element via the Direct Attachment mechanism when there exist
712 policy sets applicable to the same SCA element via the External Attachment mechanism [POL40001]

713 4.5 Direct Attachment of PolicySets

714 Direct Attachment of PolicySets can be achieved by

- 715 • Using the optional **@policySets** attribute of the SCA element

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- 716 • Adding an optional child `<policySetAttachment/>` element to the SCA element
717 The `policySets` attribute takes as its value a list of `policySet` names.
718 For example:

719
720
721
722
723
724

```
<service> or <reference>...  
  <binding.binding-type policySets="listOfQNames">  
  </binding.binding-type>  
  ...  
</service> or </reference>
```

725 *Snippet 4-4: Example of @policySets on a service*

726

727 The `<policySetAttachment/>` element is an alternative way to attach a `policySet` to an SCA composite.

728

```
<policySetAttachment name="xs:QName" />
```

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730 *Snippet 4-5: policySetAttachment Pseudo-Schema*

731

- 732 • `@name` (1..1) – the `QName` of a `policySet`.

733

734 For example:

735

```
<service> or <reference>...  
  <binding.binding-type>  
    <policySetAttachment name="sns:EnterprisePolicySet">  
  </binding.binding-type>  
  ...  
</service> or </reference>
```

742 *Snippet 4-6: Example of policySetAttachment in a service or reference*

743

744 Where an element has both a `@policySets` attribute and a `<policySetAttachment/>` child element, the
745 `policySets` declared by both are attached to the element.

746 The SCA Policy framework enables two distinct cases for utilizing intents and `PolicySets`:

- 747 • It is possible to specify QoS requirements by attaching abstract intents to an element at the time of
748 development. In this case, it is implied that the concrete bindings and policies that satisfy the abstract
749 intents are not assigned at development time but the intents are used **to select the concrete**
750 **Bindings and Policies** at deployment time. Concrete policies are encapsulated within `policySets`
751 that are applied during deployment using the external attachment mechanism. The intents associated
752 with a SCA element is the union of intents specified for it and its parent elements subject to the
753 detailed rules below.

- 754 • It is also possible to specify QoS requirements for an element by using both intents and concrete
755 policies contained in directly attached `policySets` at development time. In this case, it is possible **to**
756 **configure the policySets, by overriding the default settings in the specified policySets using**
757 **intents**. The `policySets` associated with a SCA element is the union of `policySets` specified for it and
758 its parent elements subject to the detailed rules below.

759 See also "Matching Intents and `PolicySets`" for a discussion of how intents are used to guide the selection
760 and application of specific `policySets`.

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761 4.6 External Attachment of PolicySets

762 The External Attachment for policySets is used for deployment-time application of policySets and policies
763 to SCA elements. It is called "external attachment" because the principle of the mechanism is that the
764 place that declares the attachment is separate from the composite files that contain the elements. This
765 separation provides the deployer with a way to attach policies and policySets without having to modify the
766 artifacts where they apply.

767 A PolicySet is attached to one or more elements in one of two ways:

768 a) through the @attachTo attribute of the policySet

769 b) through the @attachTo attribute of an <externalAttachment/> element which references the policySet
770 in its @policySets attribute

771 c) through a reference (via policySetReference) from a policySet that uses the @attachTo attribute.

772

773 4.6.1 Cases Where Multiple PolicySets are attached to a Single Artifact

774 Multiple PolicySets can be attached to a single artifact. This can happen either as the result of one or
775 more direct attachments or as the result of one or more external attachments which target the particular
776 artifact.

777 4.7 Attaching intents to SCA elements

778 A list of intents can be attached to any SCA element by using the @requires attribute or the <requires>
779 subelement.

780 The intents which apply to a given element depend on

- 781 • the intents expressed in its @requires attribute and/or its <requires> subelement
- 782 • intents derived from the structural hierarchy of the element
- 783 • intents derived from the implementation hierarchy of the element

784 When computing the intents that apply to a particular element, the @constrains attribute of each relevant
785 intent is checked against the element. If the intent in question does not apply to that element it is simply
786 discarded.

787 **Any two intents applied to a given element MUST NOT be mutually exclusive [POL40009].** Specific
788 examples are discussed later in this document.

789 4.7.1 Implementation Hierarchy of an Element

790 The **implementation hierarchy** occurs where a component configures an implementation and also
791 where a composite promotes a service or reference of one of its components. The implementation
792 hierarchy involves:

- 793 • a composite service or composite reference element is in the implementation hierarchy of the
794 component service/component reference element which they promote
- 795 • the component element and its descendent elements (for example, service, reference,
796 implementation) configure aspects of the implementation. Each of these elements is in the
797 implementation hierarchy of the **corresponding** element in the componentType of the
798 implementation.

799 **Rule 1: The intents declared on elements lower in the implementation hierarchy of a given element MUST**
800 **be applied to the element. [POL40014] A qualifiable intent expressed lower in the hierarchy can be**
801 **qualified further up the hierarchy, in which case the qualified version of the intent MUST apply to the**
802 **higher level element. [POL40004]**

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803 4.7.2 Structural Hierarchy of an Element

804 The structural hierarchy of an element consists of its parent element, grandparent element and so on up
805 to the <composite/> element in the composite file containing the element.

806 As an example, for the composite in Snippet 4-7::

807

```
808 <composite name="C1" requires="i1">  
809   <service name="CS" promotes="X/S">  
810     <binding.ws requires="i2">  
811     </service>  
812   <component name="X">  
813     <implementation.java class="foo"/>  
814     <service name="S" requires="i3">  
815     </component>  
816 </composite>
```

817 *Snippet 4-7: Example Composite to Illustrate Structural Hierarchy*

818

819 - the structural hierarchy of the component service element with the name "S" is the component element
820 named "X" and the composite element named "C1". Service "S" has intent "i3" and also has the intent "i1"
821 if i1 is not mutually exclusive with i3.

822 **Rule2: The intents declared on elements higher in the structural hierarchy of a given element MUST be**
823 **applied to the element EXCEPT**

- 824 • **if any of the inherited intents is mutually exclusive with an intent applied on the element, then the**
825 **inherited intent MUST be ignored**
- 826 • **if the overall set of intents from the element itself and from its structural hierarchy contains both an**
827 **unqualified version and a qualified version of the same intent, the qualified version of the intent MUST**
828 **be used..**

829 [POL40005]

830 4.7.3 Combining Implementation and Structural Policy Data

831 When there are intents present in both hierarchies implementation intents are calculated before the
832 structural intents. In other words, **When combining implementation hierarchy and structural hierarchy**
833 **policy data, Rule 1 MUST be applied BEFORE Rule 2. [POL40015]**

834 Note that each of the elements in the hierarchy below a <component> element, such as <service/>,
835 <reference/> or <binding/>, inherits intents from the equivalent elements in the componentType of the
836 implementation used by the component. So the <service/> element of the <component> inherits any
837 intents on the <service/> element with the same name in the <componentType> - and a <binding/>
838 element under the service in the component inherits any intents on the <binding/> element of the service
839 (with the same name) in the componentType. Errors caused by mutually exclusive intents appearing on
840 corresponding elements in the component and on the componentType only occur when those elements
841 match one-to-one. Mutually exclusive intents can validly occur on elements that are at different levels in
842 the structural hierarchy (as defined in Rule 2).

843 Note that it might often be the case that <binding/> elements will be specified in the structure under the
844 <component/> element in the composite file (especially at the Domain level, where final deployment
845 configuration is applied) - these elements might have no corresponding elements defined in the
846 componentType structure. In this situation, the <binding/> elements don't acquire any intents from the
847 componentType directly (ie there are no elements in the implementation hierarchy of the <binding/>
848 elements), but those <binding/> elements will acquire intents "flowing down" their structural hierarchy as
849 defined in Rule 2 - so, for example if the <service/> element is marked with @requires="confidentiality",
850 the bindings of that service will all inherit that intent, assuming that they don't have their own exclusive
851 intents specified.

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852 Also, for example, where say a component <service.../> element has an intent that is mutually exclusive
853 with an intent in the componentType<service.../> element with the same name, it is an error, but this
854 differs when compared with the case of the <component.../> element having an intent that is mutually
855 exclusive with an intent on the componentType <service/> element - because they are at different
856 structural levels: the intent on the <component/> is ignored for that <service/> element and there is no
857 error.

858 4.7.4 Examples

859 As an example, consider the composite in Snippet 4-8:

860

```
861 <composite name="C1" requires="i1">  
862   <service name="CS" promotes="X/S">  
863     <binding.ws requires="i2">  
864   </service>  
865   <component name="X">  
866     <implementation.java class="foo"/>  
867     <service name="S" requires="i3">  
868   </component>  
869 </composite>
```

870 *Snippet 4-8: Example composite with intents*

871

872 ...the component service with name "S" has the service named "S" in the componentType of the
873 implementation in its implementation hierarchy, and the composite service named "CS" has the
874 component service named "S" in its implementation hierarchy. Service "CS" acquires the intent "i3" from
875 service "S" – and also gets the intent "i1" from its containing composite "C1" IF i1 is not mutually
876 exclusive with i3.

877 When intents apply to an element following the rules described and where no policySets are attached to
878 the element, the intents for the element can be used to select appropriate policySets during deployment,
879 using the external attachment mechanism.

880 Consider the composite in Snippet 4-9:

881

```
882 <composite requires="confidentiality">  
883   <service name="foo" .../>  
884   <reference name="bar" requires="confidentiality.message"/>  
885 </composite>
```

886 *Snippet 4-9: Example reference with intents*

887

888 ...in this case, the composite declares that all of its services and references guarantee confidentiality in
889 their communication, but the "bar" reference further qualifies that requirement to specifically require
890 message-level security. The "foo" service element has the default qualifier specified for the confidentiality
891 intent (which might be transport level security) while the "bar" reference has the **confidentiality.message**
892 intent.

893 Consider the variation in Snippet 4-10 where a qualified intent is specified at the composite level:

894

```
895 <composite requires="confidentiality.transport">  
896   <service name="foo" .../>  
897   <reference name="bar" requires="confidentiality.message"/>  
898 </composite>
```

899 *Snippet 4-10: Example Qualified intents*

900

901 In this case, both the **confidentiality.transport** and the **confidentiality.message** intent are applied for
902 the reference 'bar'. If there are no bindings that support this combination, an error will be generated.
903 However, since in some cases multiple qualifiers for the same intent can be valid or there might be
904 bindings that support such combinations, the SCA specification allows this.
905

906 4.8 Usage of Intent and Policy Set Attachment together

907 As indicated above, it is possible to attach both intents and policySets to an SCA element during
908 development. The most common use cases for attaching both intents and concrete policySets to an
909 element are with binding and reference elements.

910 When the @requires attribute or the <requires> subelement and one or both of the direct policySet
911 attachment mechanisms are used together during development, it indicates the intention of the developer
912 to configure the element, such as a binding, by the application of specific policySet(s) to this element.

913 The same behavior can be enabled by external attachment of intents and policySets.

914 Developers who attach intents and policySets in conjunction with each other need to be aware of the
915 implications of how the policySets are selected and how the intents are utilized to select specific
916 intentMaps, override defaults, etc. The details are provided in the Section [Guided Selection of](#)
917 [PolicySets using Intents](#).

918 4.9 Intents and PolicySets on Implementations and Component Types

919 It is possible to specify intents and policySets within a component's implementation, which get exposed to
920 SCA through the corresponding *component type*. How the intents or policies are specified within an
921 implementation depends on the implementation technology. For example, Java can use an @requires
922 annotation to specify intents.

923 The intents and policySets specified within an implementation can be found on the

924 <sca:implementation.*> and the <sca:service> and <sca:reference> elements of the component type.

925 Snippet 4-11 shows direct attachment of intents and policySets using the @requires and @policySets
926 attributes:

```
927 <componentType>  
928   <implementation.* requires="listOfQNames" policySets="="listOfQNames">  
929     ...  
930   </implementation>  
931   <service name="myService" requires="listOfQNames"  
932     policySets="listOfQNames">  
933     ...  
934   </service>  
935   <reference name="myReference" requires="listOfQNames"  
936     policySets="="listOfQNames">  
937     ...  
938   </reference>  
939   ...  
940 </componentType>
```

941 *Snippet 4-11: Example of intents on an implementation*

942

943 Intents expressed in the component type are handled according to the rule defined for the implementation
944 hierarchy. See [Intent rule 2](#)

945 For explicitly listed policySets, the list in the component using the implementation can override policySets
946 from the component type. **If a component has any policySets attached to it (by any means), then any**
947 **policySets attached to the componentType MUST be ignored.** [POL40006]

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948 **4.10 Intents on Interfaces**

949 Interfaces are used in association with SCA services and references. These interfaces can be declared
950 in SCA composite files and also in SCA componentType files. The interfaces can be defined using a
951 number of different interface definition languages which include WSDL, Java interfaces and C++ header
952 files.

953 It is possible for some interfaces to be referenced from an implementation rather than directly from any
954 SCA files. An example of this usage is a Java implementation class file that has a reference declared
955 that in turn uses a Java interface defined separately. When this occurs, the interface definition is treated
956 from an SCA perspective as part of the componentType of the implementation, logically being part of the
957 declaration of the related service or reference element.

958 Both the declaration of interfaces in SCA and also the definitions of interfaces can carry policy-related
959 information. In particular, both the declarations and the definitions can have either intents attached to
960 them, or policySets attached to them - or both. For SCA declarations, the intents and policySets always
961 apply to the whole of the interface (ie all operations and all messages within each operation). For
962 interface definitions, intents and policySets can apply to the whole interface or they can apply only to
963 specific operations within the interface or they can even apply only to specific messages within particular
964 operations. (To see how this is done, refer to the places in the SCA specifications that deal with the
965 relevant interface definition language)

966 This means, in effect, that there are 4 places which can hold policy related information for interfaces:

- 967 1. The interface definition file that is referenced from the component type.
- 968 2. The interface declaration for a service or reference in the component type
- 969 3. The interface definition file that is referenced from the component declaration in a composite
- 970 4. The interface declaration within a component

971 When calculating the set of intents and set of policySets which apply to either a service element or to a
972 reference element of a component, intents and policySets from the interface definition and from the
973 interface declaration(s) MUST be applied to the service or reference element and to the binding
974 element(s) belonging to that element. [POL40016]

975 The locations where interfaces are defined and where interfaces are declared in the componentType and
976 in a component MUST be treated as part of the implementation hierarchy as defined in section "Attaching
977 intents to SCA elements". [POL40019]

Deleted: The locations where interfaces are defined and where interfaces are declared in the componentType and in a component MUST be treated as part of the implementation hierarchy as defined in Section 4.5 Attaching intents to SCA elements.

978 **4.11 BindingTypes and Related Intents**

979 SCA Binding types implement particular communication mechanisms for connecting components
980 together. See detailed discussion in the [SCA Assembly Specification](#) [SCA-Assembly]. Some binding
981 types can realize intents inherently by virtue of the kind of protocol technology they implement (e.g. an
982 SSL binding would natively support confidentiality). For these kinds of binding types, it might be the case
983 that using that binding type, without any additional configuration, provides a concrete realization of an
984 intent. In addition, binding instances which are created by configuring a binding type might be able to
985 provide some intents by virtue of their configuration. It is important to know, when selecting a binding to
986 satisfy a set of intents, just what the binding types themselves can provide and what they can be
987 configured to provide.

988 The bindingType element is used to declare a class of binding available in a SCA Domain. The pseudo-
989 schema for the bindingType element is shown in Snippet 4-12:

990

```

991 <bindingType type="xs:NCName"
992   alwaysProvides="sca:listOfQNames"?
993   mayProvide="sca:listOfQNames"?/>

```

994 *Snippet 4-12: bindingTypePseudo-Schema*

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- 995
- 996 • @type (1..1) – declares the NCName of the bindingType, which is used to form the QName of the
- 997 bindingType. The QName of the bindingType MUST be unique amongst the set of bindingTypes in
- 998 the SCA Domain. [POL40020]
- 999 • @alwaysProvides (0..1) – a list of intent QNames that are natively provided. A natively provided intent
- 1000 is hard-coded into the binding implementation. The function represented by the intent cannot be
- 1001 turned off.
- 1002 • @mayProvides (0..1) – a list of intent QNames that are natively provided by the binding
- 1003 implementation, but which are activated only when present in the intent set that is applied to a binding
- 1004 instance.

1005 A binding implementation MUST implement all the intents listed in the @alwaysProvides and

1006 @mayProvides attributes. [POL40021]

1007 The kind of intents a given binding might be capable of providing, beyond these inherent intents, are

1008 implied by the presence of policySets that declare the given binding in their @appliesTo attribute.

1009 For example, if the policySet in Snippet 4-13 is available in a SCA Domain it says that the (example)

1010 foo:binding.ssl can provide “reliability” in addition to any other intents it might provide inherently.

1011

```
1012 <policySet name="ReliableSSL" provides="exactlyOnce"
1013     appliesTo="//foo:binding.ssl">
1014     ...
1015 </policySet>
```

1016 Snippet 4-13: Example policySet Applied to a binding

1017 4.12 Treatment of Components with Internal Wiring

1018 This section discusses the steps involved in the development and deployment of a component and its

1019 relationship to selection of bindings and policies for wiring services and references.

1020 The SCA developer starts by defining a component. Typically, this contains services and references. It

1021 can also have intents attached at various locations within composite and component types as well as

1022 policySets attached at various locations.

1023 Both for ease of development as well as for deployment, the wiring constraints to relate services and

1024 references need to be determined. This is accomplished by matching constraints of the services and

1025 references to those of corresponding references and services in other components.

1026 In this process, the intents, and the policySets that apply to both sides of a wire play an important role. In

1027 addition, concrete policies need to be selected that satisfy the intents for the service and the reference

1028 and are also compatible with each other. For services and references that make use of bidirectional

1029 interfaces, the same determination of matching policySets also has to take place for callbacks.

1030 Determining wire compatibility plays an important role prior to deployment as well as during the

1031 deployment phases of a component. For example, during development, it helps a developer to determine

1032 whether it is possible to wire services and references using the policySets available in the development

1033 environment. During deployment, the wiring constraints determine whether wiring can be achievable. It

1034 also aids in adding additional concrete policies or making adjustments to concrete policies in order to

1035 deliver the constraints. Here are the concepts that are needed in making wiring decisions:

- 1036 • The set of intents that individually apply to *each* service or reference.
- 1037 • When possible the intents that are applied to the service, the reference and callback (if any) at the
- 1038 other end of the wire. This set is called the *required intent set* and only applies when dealing with a
- 1039 wire connecting two components within the same SCA Domain. When external connections are
- 1040 involved, from clients or to services that are outside the SCA domain, intents are only available for the
- 1041 end of the connection that is inside the domain. See Section "[Preparing Services and References](#)
- 1042 [for External Connection](#)" for more details.

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1043 • The policySets that apply to each service or reference.

1044 The set of provided intents for a binding instance is the union of the set of intents listed in the
1045 "alwaysProvides" attribute and the set of intents listed in the "mayProvides" attribute of its binding type.
1046 The capabilities represented by the "alwaysProvides" intent set are always present, irrespective of the
1047 configuration of the binding instance. Each capability represented by the "mayProvides" intent set is only
1048 present when the list of intents applied to the binding instance (either applied directly, or inherited)
1049 contains the particular intent (or a qualified version of that intent, if the intent set contains an unqualified
1050 form of a qualifiable intent). When an intent is directly provided by the binding type, there is no need to
1051 apply a policy set that provides that intent.

1052 When bidirectional interfaces are in use, the same process of selecting policySets to provide the intents is
1053 also performed for the callback bindings.

1054 4.12.1 Determining Wire Validity and Configuration

1055 The above approach determines the policySets that are used in conjunction with the binding instances
1056 listed for services and references. For services and references that are resolved using SCA wires, the
1057 policySets chosen on each side of the wire might not be compatible. The following approach is
1058 used to determine whether they are compatible and whether the wire is valid. If the wire
1059 uses a bidirectional interface, then the following technique ensures that valid configured
1060 policySets can be found for both directions of the bidirectional interface.

1061 The SCA runtime MUST determine the compatibility of the policySets at each end of a wire using the
1062 compatibility rules of the policy language used for those policySets. [POL40022] The policySets at each
1063 end of a wire MUST be incompatible if they use different policy languages. [POL40023] However, there is
1064 a special case worth mentioning:

- 1065 • If both sides of the wire use identical policySets (by referring to the same policySet by its QName in
1066 both sides of the wire), then they are compatible.

1067 Where the policy language in use for a wire is WS-Policy, strict WS-Policy intersection MUST be used to
1068 determine policy compatibility. [POL40024]

1069 In order for a reference to connect to a particular service, the policies of the reference MUST intersect
1070 with the policies of the service. [POL40025]

1071 4.13 Preparing Services and References for External Connection

1072 Services and references are sometimes not intended for SCA wiring, but for communication with software
1073 that is outside of the SCA domain. References can contain bindings that specify the endpoint address of
1074 a service that exists outside of the current SCA domain. Services can specify bindings that can be
1075 exposed to clients that are outside of the SCA domain.

1076 Matching service/reference policies across the SCA Domain boundary MUST use WS-Policy compatibility
1077 (strict WS-Policy intersection) if the policies are expressed in WS-Policy syntax. [POL40007] For other
1078 policy languages, the policy language defines the comparison semantics.

1079 For external services and references that make use of bidirectional interfaces, the same determination
1080 of matching policies has to also take place for the callback.

1081 The policies that apply to the service/reference are computed as discussed in [Guided Selection of
1082 PolicySets using Intents](#).

1083 4.14 Deployment

1084 The SCA Assembly Specification [SCA-Assembly] describes how to contribute SCA artifacts to the SCA
1085 Domain, and how to deploy them to create running components. This section discusses the Policy
1086 aspects of deployment: how intents, externalAttachments and policySets are contributed, how intents are
1087 satisfied by concrete policies in policySets and the process of redeployment when intents,
1088 externalAttachments or policySets change.

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1089 Intents, externalAttachments and policySets can be contributed to the Domain contained within
1090 contributions. These contributions might only contain policy artifacts or they might also contain
1091 composites and related artifacts. Intents and policySets can be attached to elements within a composite
1092 either by direct attachment (where an attribute or child element performs the attachment) or they can be
1093 attached through the external attachment mechanism.

1094 When a composite is deployed, the intents which are attached to each element must be evaluated, both
1095 the directly attached intents and intents attached through external attachment. For external attachment,
1096 this means evaluating the @attachTo attribute of each externalAttachment element with a non-empty
1097 @intents attribute in the SCA Domain - the intents are attached to those elements which are selected by
1098 the XPath expression in the externalAttachment/@attachTo attribute.

1099 **During the deployment of SCA composites, first all <externalAttachment/> elements within the Domain
1100 MUST be evaluated to determine which intents are attached to elements in the newly deployed composite
1101 and then all policySets within the Domain with an @attachTo attribute or <externalAttachment> elements
1102 that attach policySets MUST be evaluated to determine which policySets are attached to elements in the
1103 newly deployed composite. [POL40034]**

1104 Once the intents attached to the elements of a composite are known, the policySets attached to each
1105 element are evaluated. If external attachment of policySets is supported, then each policySet in the
1106 Domain is examined and the XPath expression of the @attachTo attribute is evaluated and the policySet
1107 is attached to SCA elements selected by the expression.

1108 **The SCA runtime MUST raise an error if the @attachTo XPath expression resolves to an SCA <property>
1109 element, or any of its children. [POL40002]**

1110 The algorithm for matching intents with policySets is described in the section "[Matching Intents and
1111 PolicySets](#)".

1112 **4.14.1 Redeployment of Intents and PolicySets**

1113 Intents and policySets can be managed separately from other SCA artifacts. It is possible for an SCA
1114 runtime to allow deployment of new intents, new externalAttachments and policySets, modification of
1115 existing intents, externalAttachments and policySets or the undeployment of existing intents,
1116 externalAttachments and policySets, while composites and components are deployed or are running in
1117 the Domain. Collectively, this is referred to as **the redeployment of intents and policySets**.

1118 Redeployment can be caused by:

- 1119 • Adding an externalAttachment element to the Domain
- 1120 • Adding a policySet with a non-empty attachTo attribute to the Domain
- 1121 • Changing the structure of an intent or policySet in the Domain that is directly or externally
1122 attached.
- 1123 • Changing the attachTo, policySets or intents attribute of a externalAttachment in the Domain.
- 1124 • Removing directly attached intents or policySets from the Domain.
- 1125 • Removing one or more externalAttachment elements from the Domain.

1126

1127 Note that an SCA runtime can choose to disallow redeployment of intents and policySets.

1128 If an SCA runtime supports the redeployment of intents and policySets, there is an implication that the
1129 changed intent and policySet artifacts can change the configuration of composites and components in the
1130 Domain. How the changes are implemented is determined by the design of the SCA runtime concerned,
1131 but there are three general approaches, as outlined in the SCA Assembly specification [SCA-Assembly]:

- 1132 • the SCA runtime can require that all existing running component instances affected by the
1133 configuration changes are stopped and then restarted using the new configuration
- 1134 • the SCA runtime can leave existing running component instances unchanged, but any new
1135 component instances are created using the new configuration

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- 1136
- 1137
- 1138
- 1139
- 1140
- 1141
- the SCA runtime can deploy the new or changed intents, externalAttachments and policySets to the SCA Domain but not activate the changes until some time in the future. Running component instances and new component instances are not affected (i.e., the component configuration is not changed) by the newly deployed intents, externalAttachments and policySets until the SCA runtime activates those changes. The means and mechanism for performing this activation is outside the scope of this specification.

1142 Redeployment of intents and policySets, when it occurs, first performs external attachment of intents followed by external attachment of policySets. After this, the algorithm for matching intents with policySets is executed. The redeployment process may succeed or it may fail, in that the set of intents attached to artifacts in the domain may or may not be satisfied. If the process of redeployment of intents, externalAttachments and/or policySets fails because one or more intents are left unsatisfied, an error MUST be raised. [POL40029] If the process of redeployment of intents, externalAttachments and/or policySets fails, the changed intents, externalAttachments and/or policySets MUST NOT be deployed and no change is made to deployed and running artifacts. [POL40030]

1150 If the redeployment of intents, externalAttachments and policySets succeeds in that all intents are satisfied, then the policies attached to one or more deployed SCA elements may change. When redeployment of intents, externalAttachments and policySets succeeds, the components whose policies are affected by the redeployment MAY have their policies updated by the SCA runtime dynamically without the need to stop and restart those components. [POL40031]

1155 Where components are updated by redeployment of intents, externalAttachments and policySets (their configuration is changed in some way, which includes changing the policies associated with a component), the new configuration MUST apply to all new instances of those components once the redeployment is complete. [POL40032] Where a component configuration is changed by the redeployment of intents, externalAttachments and policySets, the SCA runtime either MAY choose to maintain existing instances with the old configuration of the component, or the SCA runtime MAY choose to stop and discard existing instances of the component. [POL40033]

1162 4.15 Matching Intents and PolicySets

1163 This section describes the selection of concrete policies that provide the requirements expressed by the set of intents associated with an SCA element. The purpose is to construct the set of concrete policies that are attached to an element taking into account the explicitly declared policySets that are attached to an element as well as policySets that are externally attached. The aim is to satisfy all of the intents that apply to each element.

1168 If the unqualified form of a qualifiable intent is attached to an element, it can be satisfied by a policySet that specifies any one of qualified forms of the intent in the value of its @provides attribute, or it can be satisfied by a policySet which @provides the unqualified form of the intent. If the qualified form of the intent is attached to an element then it can be satisfied only by a policy that @provides that qualified form of the intent.

1173

1174 **Note: In the following, the following rule is observed when an intent set is computed.**

1175 When a profile intent is encountered in either a global @requires attribute, an intent/@requires attribute, a <requires> subelement or a policySet/@provides attribute, the profile intent is immediately replaced by the intents that it composes (i.e. all the intents that appear in the profile intent's @requires attribute). This rule is applied recursively until profile intents do not appear in an intent set. [This is stated generally here, in order to not have to restate this at multiple places].

1180 The **required intent set** that is attached to an element is:

- 1181
- 1182
- 1183
1. The set of intents attached to the element either by direct attachment or external attachment via the mechanisms described in the sections "Direct Attachment of Intents" and "External Attachment of Intents".
 2. add any intents found in any related interface definition or declaration, as described in the section "Intents on Interfaces".
- 1184
- 1185

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1186 3. add any intents found on elements below the target element in its implementation hierarchy as
1187 defined in Rule 1 in the section "[Implementation Hierarchy of an Element](#)".

1188 4. add any intents attached to each ancestor element in the element's structural hierarchy as defined in
1189 [Rule 2](#) in in the section "[Structural Hierarchy of an Element](#)"

1190 5. remove any intents that do not include the target element's type in their @constrains attribute.

1191 6. remove the unqualified version of an intent if the set also contains a qualified version of that intent

1192 **If the required intent set contains a mutually exclusive pair of intents the SCA runtime MUST reject the**
1193 **document containing the element and raise an error. [POL40017]**

1194 The **directly provided intent set** for an element is the set of intents listed in the @alwaysProvides
1195 attribute combined with the set of intents listed in the @mayProvides attribute of the bindingType or
1196 implementationType declaration for a binding or implementation element respectively.

1197 The **set of PolicySets attached to an element** include those **explicitly specified** using the @policySets
1198 attribute or the <policySetAttachment/> element and those which are **externally attached**.

1199 A policySet **applies to** a target element if the result of the XPath expression contained in the policySet's
1200 @appliesTo attribute, when evaluated against the document containing the target element, includes the
1201 target element. For example, @appliesTo="//binding.ws[@impl='axis']" matches any binding.ws element
1202 that has an @impl attribute value of 'axis'.

1203 The set of **explicitly specified** policySets for an element is:

1204 1. The union of the policySets specified in the element's @policySets attribute and those specified in
1205 any <policySetAttachment/> child element(s).

1206 2. add the policySets declared in the @policySets attributes and <policySetAttachment/> elements from
1207 elements in the structural hierarchy of the element.

1208 3. remove any policySet where the policySet does not apply to the target element.
1209 *It is not an error for a policySet to be attached to an element to which it doesn't apply.*

1210 The set of **externally attached** policySets for an element is:

1211 1. Each <PolicySet/> in the Domain where the element is targeted by the @attachTo attribute of the
1212 policySet

1213 2. Each PolicySet that is attached to the target element through use of the <externalAttachment/>
1214 element

1215 3. remove any policySet where the policySet does not apply to the target element.
1216 *It is not an error for a policySet to be attached to an element to which it doesn't apply.*

1217 A policySet **provides an intent** if any of the statements are true:

1218 1. The intent is contained in the @provides list of the policySet.

1219 2. The intent is a qualified intent and the unqualified form of the intent is contained in the @provides list
1220 of the policySet.

1221 3. The policySet @provides list contains a qualified form of the intent (where the intent is qualifiable).

1222 **All intents in the required intent set for an element MUST be provided by the directly provided intents set**
1223 **and the set of policySets that apply to the element, or else an error is raised. [POL40018]**

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1225

5 Implementation Policies

1226

The basic model for Implementation Policies is very similar to the model for interaction policies described above. Abstract QoS requirements, in the form of intents, can be associated with SCA component implementations to indicate implementation policy requirements. These abstract capabilities are mapped to concrete policies via policySets at deployment time. Alternatively, policies can be associated directly with component implementations using policySets. Intents and policySets can be attached to an implementation using any of the mechanisms described in "Attaching Intents and PolicySets to SCA Constructs".

1233

Snippet 5-1 shows one way of associating intents with an implementation:

1234

1235

```
<component name="xs:NCName" ... >
  <implementation.* ... requires="listOfQNames">
    ...
  </implementation>
  ...
</component>
```

1237

1238

1239

1240

1241

Snippet 5-1: Example of intents Associated with an implementation

1242

1243

If, for example, one of the intent names in the value of the @requires attribute is 'logging', this indicates that all messages to and from the component have to be logged. The technology used to implement the logging is unspecified. Specific technology is selected when the intent is mapped to a policySet (unless the implementation type has native support for the intent, as described in the next section). A list of implementation intents can also be specified by any ancestor element of the <sca:implementation> element. The effective list of implementation intents is the union of intents specified on the implementation element and all its ancestors.

1250

In addition, one or more policySets can be specified directly by associating them with the implementation of a component.

1251

1252

1253

```
<component name="xs:NCName" ... >
  <implementation.* ... policySets="listOfQNames">
    ...
  </implementation>
  ...
</component>
```

1255

1256

1257

1258

1259

Snippet 5-2: Example of policySets Associated with an implementation

1260

1261

Snippet 5-2 shows how intents and policySets can be specified on a component. It is also possible to specify intents and policySets within the implementation. How this is done is defined by the implementation type.

1264

The intents and policy sets are specified on the <sca:implementation.*> element within the component type. This is important because intent and policy set definitions need to be able to specify that they constrain an appropriate implementation type.

1266

1267

1268

```
<componentType>
  <implementation.* requires="listOfQNames" policySets="listOfQNames">
    ...
  </implementation>
  ...
</componentType>
```

1270

1271

1272

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1273 `</componentType>`

1274 *Snippet 5-3: intents and policySets Constraining an implementation*

1275
1276 When applying policies, the intents attached to the implementation are added to the intents attached to
1277 the using component. For the explicitly listed policySets, the list in the component can override policySets
1278 from the componentType.

1279 Some implementation intents are targeted at `<binding/>` elements rather than at `<implementation/>`
1280 elements. This occurs in cases where there is a need to influence the operation of the binding
1281 implementation code rather than the code directly related to the implementation itself. Implementation
1282 elements of this kind will have a `@constrains` attribute pointing to a binding element, with a `@intentType`
1283 of "implementation".

1284 5.1 Natively Supported Intents

1285 Each implementation type (e.g. `<sca:implementation.java>` or `<sca:implementation.bpel>`) has an
1286 **implementation type definition** within the SCA Domain. An implementation type definition is declared
1287 using an `implementationType` element within a `<definitions/>` declaration. The pseudo-schema for the
1288 `implementationType` element is shown in Snippet 5-4:

1289

```
1290 <implementationType type="xs:QName"  
1291 alwaysProvides="sca:listOfQNames"? mayProvide="sca:listOfQNames"? />
```

1292 *Snippet 5-4: implementationType Pseudo-Schema*

1293

1294 The implementation Type element has the following attributes:

- 1295 • **name : QName (1..1)** - the name of the implementationType. The implementationType name attribute
1296 MUST be the QName of an XSD global element definition used for implementation elements of that
1297 type. [POL50001] For example: "sca:implementation.java".
- 1298 • **alwaysProvides : list of QNames (0..1)** - a set of intents. The intents in the alwaysProvides set are
1299 always provided by this implementation type, whether the intents are attached to the using
1300 component or not.
- 1301 • **mayProvide : list of QNames (0..1)** - a set of intents. The intents in the mayProvide set are provided
1302 by this implementation type if the intent in question is attached to the using component.

1303 5.2 Writing PolicySets for Implementation Policies

1304 The `@appliesTo` and `@attachTo` attributes for a policySet take an XPath expression that is applied to a
1305 service, reference, binding or an implementation element. For implementation policies, in most cases, all
1306 that is needed is the QName of the implementation type. Implementation policies can be expressed using
1307 any policy language (which is to say, any configuration language). For example, XACML or EJB-style
1308 annotations can be used to declare authorization policies. Other capabilities could be configured using
1309 completely proprietary configuration formats.

1310 For example, a policySet declared to turn on trace-level logging for a BPEL component could be declared
1311 as is Snippet 5-5:

1312

```
1313 <policySet name="loggingPolicy" provides="acme:logging.trace"  
1314 appliesTo="//sca:implementation.bpel" ...>  
1315 <acme:processLogging level="3"/>  
1316 </policySet>
```

1317 *Snippet 5-5: Example policySet Applied to implemenation.bpel*

1318 **5.2.1 Non WS-Policy Examples**

1319 Authorization policies expressed in XACML could be used in the framework in two ways:

1320 1. Embed XACML expressions directly in the PolicyAttachment element using the extensibility elements
1321 discussed above, or

1322 2. Define WS-Policy assertions to wrap XACML expressions.

1323 For EJB-style authorization policy, the same approach could be used:

1324 1. Embed EJB-annotations in the PolicyAttachment element using the extensibility elements discussed
1325 above, or

1326 2. Use the WS-Policy assertions defined as wrappers for EJB annotations.

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1327 6 Roles and Responsibilities

1328 There are 4 roles that are significant for the SCA Policy Framework. The following is a list of the roles and
1329 the artifacts that the role creates:

- 1330 • Policy Administrator – policySet definitions and intent definitions
- 1331 • Developer – Implementations and component types
- 1332 • Assembler - Composites
- 1333 • Deployer – Composites and the SCA Domain (including the logical Domain-level composite)

1334 6.1 Policy Administrator

1335 An intent represents a requirement that a developer or assembler can make, which ultimately have to be
1336 satisfied at runtime. The full definition of the requirement is the informal text description in the intent
1337 definition.

1338 The **policy administrator**'s job is to both define the intents that are available and to define the policySets
1339 that represent the concrete realization of those informal descriptions for some set of binding type or
1340 implementation types. See the sections on intent and policySet definitions for the details of those
1341 definitions.

1342 6.2 Developer

1343 When it is possible for a component to be written without assuming a specific binding type for its services
1344 and references, then the **developer** uses intents to specify requirements in a binding neutral way.

1345 If the developer requires a specific binding type for a component, then the developer can specify bindings
1346 and policySets with the implementation of the component. Those bindings and policySets will be
1347 represented in the component type for the implementation (although that component type might be
1348 generated from the implementation).

1349 If any of the policySets used for the implementation include intentMaps, then the default choice for the
1350 intentMap can be overridden by an assembler or deployer by requiring a qualified intent that is present in
1351 the intentMap.

1352 6.3 Assembler

1353 An **assembler** creates composites. Because composites are implementations, an assembler is like a
1354 developer, except that the implementations created by an assembler are composites made up of other
1355 components wired together. So, like other developers, the assembler can specify intents or bindings or
1356 policySets on any service or reference of the composite.

1357 However, in addition the definition of composite-level services and references, it is also possible for the
1358 assembler to use the policy framework to further configure components within the composite. The
1359 assembler can add additional requirements to any component's services or references or to the
1360 component itself (for implementation policies). The assembler can also override the bindings or
1361 policySets used for the component. See the assembly specification's description of overriding rules for
1362 details on overriding.

1363 As a shortcut, an assembler can also specify intents and policySets on any element in the composite
1364 definition, which has the same effect as specifying those intents and policySets on every applicable
1365 binding or implementation below that element (where applicability is determined by the @appliesTo
1366 attribute of the policySet definition or the @constrains attribute of the intent definition).

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1367 **6.4 Deployer**

1368 A **deployer** deploys implementations (typically composites) into the SCA Domain. It is the
1369 deployers job to make the final decisions about all configurable aspects of an implementation that is to be
1370 deployed and to make sure that all intents are satisfied.

1371 If the deployer determines that an implementation is correctly configured as it is, then the implementation
1372 can be deployed directly. However, more typically, the deployer will create a new composite, which
1373 contains a component for each implementation to be deployed along with any changes to the bindings or
1374 policySets that the deployer desires.

1375 When the deployer is determining whether the existing list of policySets is correct for a component, the
1376 deployer needs to consider both the explicitly listed policySets as well as the policySets that will be
1377 chosen according to the algorithm specified in [Guided Selection of PolicySets using Intents](#).

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1378 7 Security Policy

1379 The SCA Security Model provides SCA developers the flexibility to specify the necessary level of security
1380 protection for their components to satisfy business requirements without the burden of understanding
1381 detailed security mechanisms.

1382 The SCA Policy framework distinguishes between two types of policies: **interaction policy** and
1383 **implementation policy**. Interaction policy governs the communications between clients and service
1384 providers and typically applies to Services and References. In the security space, interaction policy is
1385 concerned with client and service provider authentication and message protection requirements.
1386 Implementation policy governs security constraints on service implementations and typically applies to
1387 Components. In the security space, implementation policy concerns include access control, identity
1388 delegation, and other security quality of service characteristics that are pertinent to the service
1389 implementations.

1390 The SCA security interaction policy can be specified via intents or policySets. Intents represent security
1391 quality of service requirements at a high abstraction level, independent from security protocols, while
1392 policySets specify concrete policies at a detailed level, which are typically security protocol specific.

1393 The SCA security policy can be specified either in an SCA composite or by using the External Policy
1394 Attachment Mechanism or by annotations in the implementation code. Language-specific annotations are
1395 described in the respective language Client and Implementation specifications.

1396 7.1 Security Policy Intents

1397 The SCA security specification defines the following intents to specify interaction policy:
1398 serverAuthentication, clientAuthentication, confidentiality, and integrity.

- 1399 • **serverAuthentication** – When *serverAuthentication* is present, an SCA runtime MUST ensure that
1400 the server is authenticated by the client. [POL70013]
- 1401 • **clientAuthentication** – When *clientAuthentication* is present, an SCA runtime MUST ensure that the
1402 client is authenticated by the server. [POL70014]
- 1403 • **authentication** – this is a profile intent that requires only clientAuthentication. It is included for
1404 backwards compatibility.
- 1405 • **mutualAuthentication** – this is a profile intent that includes the serverAuthentication and the
1406 clientAuthentication intents just described.
- 1407 • **confidentiality** – the confidentiality intent is used to indicate that the contents of a message are
1408 accessible only to those authorized to have access (typically the service client and the service
1409 provider). A common approach is to encrypt the message, although other methods are possible.
1410 When confidentiality is present, an SCA Runtime MUST ensure that only authorized entities can view
1411 the contents of a message. [POL70009]
- 1412 • **integrity** – the integrity intent is used to indicate that assurance is that the contents of a message
1413 have not been tampered with and altered between sender and receiver. A common approach is to
1414 digitally sign the message, although other methods are possible. When integrity is present, an SCA
1415 Runtime MUST ensure that the contents of a message are not altered. [POL70010]

1416 The formal definitions of these intents are in the [Intent Definitions appendix](#).

1417 7.2 Interaction Security Policy

1418 Any one of the three security intents can be further qualified to specify more specific business
1419 requirements. Two qualifiers are defined by the SCA security specification: transport and message, which
1420 can be applied to any of the above three intent's.

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1421 **7.2.1 Qualifiers**

1422 **transport** – the transport qualifier specifies that the qualified intent is realized at the transport or transfer
1423 layer of the communication protocol, such as HTTPS. When a serverAuthentication, clientAuthentication,
1424 confidentiality or integrity intent is qualified by message, an SCA Runtime MUST delegate
1425 serverAuthentication, clientAuthentication, confidentiality and integrity, respectively, to the message layer
1426 of the communication protocol. [POL70011]

1427 **message** – the message qualifier specifies that the qualified intent is realized at the message level of the
1428 communication protocol. When a serverAuthentication, clientAuthentication, confidentiality or integrity
1429 intent is qualified by message, an SCA Runtime MUST delegate serverAuthentication,
1430 clientAuthentication, confidentiality and integrity, respectively, to the message layer of the communication
1431 protocol.[POL70012]

1432

1433 Snippet 7-1 shows the usage of intents and qualified intents.

1434

```
1435 <composite name="example" requires="confidentiality">  
1436   <service name="foo"/>  
1437   ...  
1438   <reference name="bar" requires="confidentiality.message"/>  
1439 </composite>
```

1440 *Snippet 7-1: Example using Qualified Intents*

1441

1442 In this case, the composite declares that all of its services and references have to guarantee
1443 confidentiality in their communication by setting requires="confidentiality". This applies to the "foo"
1444 service. However, the "bar" reference further qualifies that requirement to specifically require message-
1445 level security by setting requires="confidentiality.message".

1446 **7.3 Implementation Security Policy Intent**

1447 The SCA Security specification defines the **authorization** intent to specify implementation policy.

1448 **authorization** – the authorization intent is used to indicate that a client needs to be authorized before
1449 being allowed to use the service. Being authorized means that a check is made as to whether any
1450 policies apply to the client attempting to use the service, and if so, those policies govern whether or not
1451 the client is allowed access. When **authorization** is present, an SCA Runtime MUST ensure that the client
1452 is authorized to use the service. [POL70001]

1453 This unqualified authorization intent implies that basic "Subject-Action-Resource" authorization support is
1454 required, where Subject may be as simple as a single identifier representing the identity of the client,
1455 Action may be a single identifier representing the operation the client intends to apply to the Resource,
1456 and the Resource may be a single identifier representing the identity of the Resource to which the Action
1457 is intended to be applied.

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1458

8 Reliability Policy

1459

Failures can affect the communication between a service consumer and a service provider.

1460

Depending on the characteristics of the binding, these failures could cause messages to be redelivered,

1461

delivered in a different order than they were originally sent out or even worse, could cause messages to

1462

be lost. Some transports like JMS provide built-in reliability features such as "at least once" and "exactly

1463

once" message delivery. Other transports like HTTP need to have additional layers built on top of them to

1464

provide some of these features.

1465

The events that occur due to failures in communication can affect the outcome of the service invocation.

1466

For an implementation of a stock trade service, a message redelivery could result in a new trade. A client

1467

(i.e. consumer) of the same service could receive a fault message if trade orders are not delivered to the

1468

service implementation in the order they were sent out. In some cases, these failures could have dramatic

1469

consequences.

1470

An SCA developer can anticipate some types of failures and work around them in service

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implementations. For example, the implementation of a stock trade service could be designed to support

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duplicate message detection. An implementation of a purchase order service could have built in logic that

1473

orders the incoming messages. In these cases, service implementations don't need the binding layers to

1474

provide these reliability features (e.g. duplicate message detection, message ordering). However, this

1475

comes at a cost: extra complexity is built in the service implementation. Along with business logic, the

1476

service implementation has additional logic that handles these failures.

1477

Although service implementations can work around some of these types of failures, it is worth noting that

1478

workarounds are not always possible. A message can be lost or expire even before it is delivered to the

1479

service implementation.

1480

Instead of handling some of these issues in the service implementation, a better way is to use a binding

1481

or a protocol that supports reliable messaging. This is better, not just because it simplifies application

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development, it can also lead to better throughput. For example, there is less need for application-level

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acknowledgement messages. A binding supports reliable messaging if it provides features such as

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message delivery guarantees, duplicate message detection and message ordering.

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It is very important for the SCA developer to be able to require, at design-time, a binding or protocol that

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supports reliable messaging. SCA defines a set of policy intents that can be used for specifying reliable

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messaging Quality of Service requirements. These reliable messaging intents establish a contract

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between the binding layer and the application layer (i.e. service implementation or the service consumer

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implementation) (see below).

8.1 Reliability Policy Intents

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Based on the use-cases described above, the following policy intents are defined:

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1. **atLeastOnce** - The binding implementation guarantees that a message that is successfully sent by a service consumer is delivered to the destination (i.e. service implementation). The message could be delivered more than once to the service implementation. **When atLeastOnce is present, an SCA Runtime MUST deliver a message to the destination service implementation, and MAY deliver duplicates of a message to the service implementation. [POL80001]**

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The binding implementation guarantees that a message that is successfully sent by a service

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implementation is delivered to the destination (i.e. service consumer). The message could be

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delivered more than once to the service consumer.

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2. **atMostOnce** - The binding implementation guarantees that a message that is successfully sent by a service consumer is not delivered more than once to the service implementation. The binding implementation does not guarantee that the message is delivered to the service implementation.

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When atMostOnce is present, an SCA Runtime MAY deliver a message to the destination service

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1504 implementation, and MUST NOT deliver duplicates of a message to the service implementation.
 1505 [POL80002]

1506 The binding implementation guarantees that a message that is successfully sent by a service
 1507 implementation is not delivered more than once to the service consumer. The binding implementation
 1508 does not guarantee that the message is delivered to the service consumer.

1509 3. **ordered** – The binding implementation guarantees that the messages sent by a service client via a
 1510 single service reference are delivered to the target service implementation in the order in which they
 1511 were sent by the service client. This intent does not guarantee that messages that are sent by a
 1512 service client are delivered to the service implementation. Note that this intent has nothing to say
 1513 about the ordering of messages sent via different service references by a single service client, even if
 1514 the same service implementation is targeted by each of the service references. **When ordered is
 1515 present, an SCA Runtime MUST deliver messages sent by a single source to a single destination
 1516 service implementation in the order that the messages were sent by that source.** [POL80003]

1517 For service interfaces that involve messages being sent back from the service implementation to the
 1518 service client (eg. a service with a callback interface), for this intent, the binding implementation
 1519 guarantees that the messages sent by the service implementation over a given wire are delivered to
 1520 the service client in the order in which they were sent by the service implementation. This intent does
 1521 not guarantee that messages that are sent by the service implementation are delivered to the service
 1522 consumer.

1523 4. **exactlyOnce** - The binding implementation guarantees that a message sent by a service consumer is
 1524 delivered to the service implementation. Also, the binding implementation guarantees that the
 1525 message is not delivered more than once to the service implementation. **When exactlyOnce is
 1526 present, an SCA Runtime MUST deliver a message to the destination service implementation and
 1527 MUST NOT deliver duplicates of a message to the service implementation.** [POL80004]

1528 The binding implementation guarantees that a message sent by a service implementation is delivered
 1529 to the service consumer. Also, the binding implementation guarantees that the message is not
 1530 delivered more than once to the service consumer.

1531 NOTE: This is a profile intent, which is composed of *atLeastOnce* and *atMostOnce*.

1532 This is the most reliable intent since it guarantees the following:

- 1533 – message delivery – all the messages sent by a sender are delivered to the service
 1534 implementation (i.e. Java class, BPEL process, etc.).
- 1535 – duplicate message detection and elimination – a message sent by a sender is not processed
 1536 more than once by the service implementation.

1537 The formal definitions of these intents are in the [Intent Definitions appendix](#).

1538 How can a binding implementation guarantee that a message that it receives is delivered to the service
 1539 implementation? One way to do it is by persisting the message and keeping redelivering it until it is
 1540 processed by the service implementation. That way, if the system crashes after delivery but while
 1541 processing it, the message will be redelivered on restart and processed again. Since a message could be
 1542 delivered multiple times to the service implementation, this technique usually requires the service
 1543 implementation to perform duplicate message detection. However, that is not always possible. Often
 1544 times service implementations that perform critical operations are designed without having support for
 1545 duplicate message detection. Therefore, they cannot *process* an incoming message more than once.

1546 Also, consider the scenario where a message is delivered to a service implementation that does not
 1547 handle duplicates - the system crashes after a message is delivered to the service implementation but
 1548 before it is completely processed. Does the underlying layer redeliver the message on restart? If it did
 1549 that, there is a risk that some critical operations (e.g. sending out a JMS message or updating a DB table)
 1550 will be executed again when the message is processed. On the other hand, if the underlying layer does
 1551 not redeliver the message, there is a risk that the message is never completely processed.

1552 This issue cannot be safely solved unless all the critical operations performed by the service

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1553 implementation are running in a transaction. Therefore, *exactlyOnce* cannot be assured without involving
1554 the service implementation. In other words, an *exactlyOnce* message delivery does not guarantee
1555 *exactlyOnce* message processing unless the service implementation is transactional. It's worth noting that
1556 this is a necessary condition but not sufficient. The underlying layer (e.g. binding implementation,
1557 container) would have to ensure that a message is not redelivered to the service implementation after the
1558 transaction is committed. As an example, a way to ensure it when the binding uses JMS is by making
1559 sure the operation that acknowledges the message is executed in the same transaction the service
1560 implementation is running in.

1561 8.2 End-to-end Reliable Messaging

1562 Failures can occur at different points in the message path: in the binding layer on the sender side, in the
1563 transport layer or in the binding layer on the receiver side. The SCA service developer doesn't really care
1564 where the failure occurs. Whether a message was lost due to a network failure or due to a crash of the
1565 machine where the service is deployed, is not that important. What is important is that the contract
1566 between the application layer (i.e. service implementation or service consumer) and the binding layer is
1567 not violated (e.g. a message that was successfully transmitted by a sender is always delivered to the
1568 destination; a message that was successfully transmitted by a sender is not delivered more than once to
1569 the service implementation, etc). It is worth noting that the binding layer could throw an exception when a
1570 sender (e.g. service consumer, service implementation) sends a message out. This is not considered a
1571 successful message transmission.

1572 In order to ensure the semantics of the reliable messaging intents, the entire message path, which is
1573 composed of the binding layer on the client side, the transport layer and the binding layer on the service
1574 side, has to be reliable.

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1575 9 Transactions

1576 SCA recognizes that the presence or absence of infrastructure for ACID transaction coordination has a
1577 direct effect on how business logic is coded. In the absence of ACID transactions, developers have to
1578 provide logic that coordinates the outcome, compensates for failures, etc. In the presence of ACID
1579 transactions, the underlying infrastructure is responsible for ensuring the ACID nature of all interactions.
1580 SCA provides declarative mechanisms for describing the transactional environment needed by the
1581 business logic.

1582 Components that use a synchronous interaction style can be part of a single, distributed ACID transaction
1583 within which all transaction resources are coordinated to either atomically commit or rollback. The
1584 transmission or receipt of oneway messages can, depending on the transport binding, be coordinated as
1585 part of an ACID transaction as illustrated in the “*OneWay Invocations*” section below. Well-known, higher-
1586 level patterns such as store-and-forward queuing can be accomplished by composing transacted one-
1587 way messages with reliable-messaging policies.

1588 This document describes the set of abstract policy intents – both implementation intents and interaction
1589 intents – that can be used to describe the requirements on a concrete service component and binding
1590 respectively.

1591 9.1 Out of Scope

1592 The following topics are outside the scope of this document:

- 1593 • The means by which transactions are created, propagated and established as part of an execution
1594 context. These are details of the SCA runtime provider and binding provider.
- 1595 • The means by which a transactional resource manager (RM) is accessed. These include, but are not
1596 restricted to:
 - 1597 – abstracting an RM as an sca:component
 - 1598 – accessing an RM directly in a language-specific and RM-specific fashion
 - 1599 – abstracting an RM as an sca:binding

1600 9.2 Common Transaction Patterns

1601 In the absence of any transaction policies there is no explicit transactional behavior defined for the SCA
1602 service component or the interactions in which it is involved and the transactional behavior is
1603 environment-specific. An SCA runtime provider can choose to define an out of band default transactional
1604 behavior that applies in the absence of any transaction policies.

1605 Environment-specific default transactional behavior can be overridden by specifying transactional intents
1606 described in this document. The most common transaction patterns can be summarized:

1607 **Managed, shared global transaction pattern** – the service always runs in a global transaction context
1608 regardless of whether the requester runs under a global transaction. If the requester does run under a
1609 transaction, the service runs under the same transaction. Any outbound, synchronous request-response
1610 messages will – unless explicitly directed otherwise – propagate the service’s transaction context. This
1611 pattern offers the highest degree of data integrity by ensuring that any transactional updates are
1612 committed atomically

1613 **Managed, local transaction pattern** – the service always runs in a managed local transaction context
1614 regardless of whether the requester runs under a transaction. Any outbound messages will not propagate
1615 any transaction context. This pattern is advisable for services that wish the SCA runtime to demarcate
1616 any resource manager local transactions and do not require the overhead of atomicity.

1617 The use of transaction policies to specify these patterns is illustrated later in Table 9-2.

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1618 9.3 Summary of SCA Transaction Policies

1619 This specification defines implementation and interaction policies that relate to transactional QoS in
1620 components and their interactions. The SCA transaction policies are specified as intents which represent
1621 the transaction quality of service behavior offered by specific component implementations or bindings.

1622 SCA transaction policy can be specified either in an SCA composite or annotatively in the implementation
1623 code. Language-specific annotations are described in the respective language binding specifications, for
1624 example the [SCA Java Common Annotations and APIs specification](#) [SCA-Java-Annotations].

1625 This specification defines the following implementation transaction policies:

- 1626 • managedTransaction – Describes the service component’s transactional environment.
- 1627 • transactedOneWay and immediateOneWay – two mutually exclusive intents that describe whether
1628 the SCA runtime will process OneWay messages immediately or will enqueue (from a client
1629 perspective) and dequeue (from a service perspective) a OneWay message as part of a global
1630 transaction.

1631 This specification also defines the following interaction transaction policies:

- 1632 • propagatesTransaction and suspendsTransaction – two mutually exclusive intents that describe
1633 whether the SCA runtime propagates any transaction context to a service or reference on a
1634 synchronous invocation.

1635 Finally, this specification defines a profile intent called managedSharedTransaction that combines the
1636 managedTransaction intent and the propagatesTransaction intent so that the **managed, shared global**
1637 **transaction pattern** is easier to configure.

1638 9.4 Global and local transactions

1639 This specification describes “managed transactions” in terms of either “global” or “local” transactions. The
1640 “managed” aspect of managed transactions refers to the transaction environment provided by the SCA
1641 runtime for the business component. Business components can interact with other business components
1642 and with resource managers. The managed transaction environment defines the transactional context
1643 under which such interactions occur.

1644 9.4.1 Global transactions

1645 From an SCA perspective, a global transaction is a unit of work scope within which transactional work is
1646 atomic. If multiple transactional resource managers are accessed under a global transaction then the
1647 transactional work is coordinated to either atomically commit or rollback regardless using a 2PC protocol.
1648 A global transaction can be propagated on synchronous invocations between components – depending
1649 on the interaction intents described in this specification - such that multiple, remote service providers can
1650 execute distributed requests under the same global transaction.

1651 9.4.2 Local transactions

1652 From a resource manager perspective a resource manager local transaction (RMLT) is simply the
1653 absence of a global transaction. But from an SCA perspective it is not enough to simply declare that a
1654 piece of business logic runs without a global transaction context. Business logic might need to access
1655 transactional resource managers without the presence of a global transaction. The business logic
1656 developer still needs to know the expected semantic of making one or more calls to one or more resource
1657 managers, and needs to know when and/or how the resource managers local transactions will be
1658 committed. The term *local transaction containment* (LTC) is used to describe the SCA environment where
1659 there is no global transaction. The boundaries of an LTC are scoped to a remotable service provider
1660 method and are not propagated on invocations between components. Unlike the resources in a global
1661 transaction, RMLTs coordinated within a LTC can fail independently.

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1663 The two most common patterns for components using resource managers outside a global transaction
1664 are:

- 1665 • The application desires each interaction with a resource manager to commit after every interaction.
1666 This is the default behavior provided by the **noManagedTransaction** policy (defined below in
1667 “[Transaction implementation policy](#)”) in the absence of explicit use of RMLT verbs by the application.
- 1668 • The application desires each interaction with a resource manager to be part of an extended local
1669 transaction that is committed at the end of the method. This behavior is specified by the
1670 **managedTransaction.local** policy (defined below in “[Transaction implementation policy](#)”).

1671 While an application can use interfaces provided by the resource adapter to explicitly demarcate resource
1672 manager local transactions (RMLT), this is a generally undesirable burden on applications, which typically
1673 prefer all transaction considerations to be managed by the SCA runtime. In addition, once an application
1674 codes to a resource manager local transaction interface, it might never be redeployed with a different
1675 transaction environment since local transaction interfaces might not be used in the presence of a global
1676 transaction. This specification defines intents to support both these common patterns in order to provide
1677 portability for applications regardless of whether they run under a global transaction or not.

1678 9.5 Transaction implementation policy

1679 9.5.1 Managed and non-managed transactions

1680 The mutually exclusive **managedTransaction** and **noManagedTransaction** intents describe the
1681 transactional environment needed by a service component or composite. SCA provides transaction
1682 environments that are managed by the SCA runtime in order to remove the burden of coding transaction
1683 APIs directly into the business logic. The **managedTransaction** and **noManagedTransaction** intents
1684 can be attached to the `sca:composite` or `sca:componentType` elements.

1685 The mutually exclusive **managedTransaction** and **noManagedTransaction** intents are defined as
1686 follows:

- 1687 • **managedTransaction** – a managed transaction environment is necessary in order to run this
1688 component. The specific type of managedTransaction needed is not constrained. The valid qualifiers
1689 for this intent are mutually exclusive.
 - 1690 – **managedTransaction.global** – There has to be an atomic transaction in order to run this
1691 component. For a component marked with `managedTransaction.global`, the SCA runtime
1692 MUST ensure that a global transaction is present before dispatching any method on the
1693 component. [POL90003] The SCA runtime uses any transaction propagated from the client
1694 or else begins and completes a new transaction. See the **propagatesTransaction** intent
1695 below for more details.
 - 1696 – **managedTransaction.local** – indicates that the component cannot tolerate running as part
1697 of a global transaction. A component marked with `managedTransaction.local` MUST run
1698 within a local transaction containment (LTC) that is started and ended by the SCA runtime.
1699 [POL90004] Any global transaction context that is propagated to the hosting SCA runtime is
1700 not visible to the target component. Any interaction under this policy with a resource manager
1701 is performed in an extended resource manager local transaction (RMLT). Upon successful
1702 completion of the invoked service method, any RMLTs are implicitly requested to commit by
1703 the SCA runtime. Note that, unlike the resources in a global transaction, RMLTs so
1704 coordinated in a LTC can fail independently. If the invoked service method completes with a
1705 non-business exception then any RMLTs are implicitly rolled back by the SCA runtime. In this
1706 context a business exception is any exception that is declared on the component interface
1707 and is therefore anticipated by the component implementation. The manner in which
1708 exceptions are declared on component interfaces is specific to the interface type – for
1709 example, Java interface types declare Java exceptions, WSDL interface types define
1710 `wsdl:faults`. Local transactions MUST NOT be propagated outbound across remotable
1711 interfaces. [POL90006]

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- 1712 • **noManagedTransaction** – indicates that the component runs without a managed transaction, under
1713 neither a global transaction nor an LTC. A transaction that is propagated to the hosting SCA runtime
1714 MUST NOT be joined by the hosting runtime on behalf of a component marked with
1715 noManagedTransaction. [POL90007] When interacting with a resource manager under this policy, the
1716 application (and not the SCA runtime) is responsible for controlling any resource manager local
1717 transaction boundaries, using resource-provider specific interfaces (for example a Java
1718 implementation accessing a JDBC provider has to choose whether a Connection is set to
1719 autoCommit(true) or else it has to call the Connection commit or rollback method). SCA defines no
1720 APIs for interacting with resource managers.
 - 1721 • **(absent)** – The absence of a transaction implementation intent leads to runtime-specific behavior. A
1722 runtime that supports global transaction coordination can choose to provide a default behavior that is
1723 the managed, shared global transaction pattern but it is not mandated to do so.
- 1724 The formal definitions of these intents are in the [Intent Definitions appendix](#).

1725 9.5.2 OneWay Invocations

1726 When a client uses a reference and sends a OneWay message then any client transaction context is not
1727 propagated. However, the OneWay invocation on the reference can itself be **transacted**. Similarly, from a
1728 service perspective, any received OneWay message cannot propagate a transaction context but the
1729 delivery of the OneWay message can be **transacted**. A **transacted** OneWay message is a one-way
1730 message that - because of the capability of the service or reference binding - can be enqueued (from a
1731 client perspective) or dequeued (from a service perspective) as part of a global transaction.

1732 SCA defines two mutually exclusive implementation intents, **transactedOneWay** and
1733 **immediateOneWay**, that determine whether OneWay messages are transacted or delivered immediately.

1734 Either of these intents can be attached to the sca:service or sca:reference elements or they can be
1735 attached to the sca:component element, indicating that the intent applies to any service or reference
1736 element children.

1737 The intents are defined as follows:

- 1738 • **transactedOneWay** – When a reference is marked as transactedOneWay, any OneWay invocation
1739 messages MUST be transacted as part of a client global transaction. [POL90008]
1740 If the client component is not configured to run under a global transaction or if the binding does not
1741 support transactional message sending, then a reference MUST NOT be marked as
1742 transactedOneWay. [POL90009] If a service is marked as transactedOneWay, any OneWay
1743 invocation message MUST be received from the transport binding in a transacted fashion, under the
1744 target service's global transaction. [POL90010] The **transactedOneWay** intent MUST NOT be
1745 attached to a request/response operation. [POL90028] The receipt of the message from the binding is
1746 not committed until the service transaction commits; if the service transaction is rolled back the the
1747 message remains available for receipt under a different service transaction. If the component is not
1748 configured to run under a global transaction or if the binding does not support transactional message
1749 receipt, then a service MUST NOT be marked as transactedOneWay. [POL90011]
- 1750 • **immediateOneWay** – When applied to a reference indicates that any OneWay invocation messages
1751 MUST be sent immediately regardless of any client transaction. [POL90012] When applied to a
1752 service indicates that any OneWay invocation MUST be received immediately regardless of any
1753 target service transaction. [POL90013] The **immediateOneWay** intent MUST NOT be attached to a
1754 request/response operation. [POL90029] The outcome of any transaction under which an
1755 immediateOneWay message is processed has no effect on the processing (sending or receipt) of that
1756 message.

1757 The absence of either intent leads to runtime-specific behavior. The SCA runtime can send or receive a
1758 OneWay message immediately or as part of any sender/receiver transaction. The results of combining
1759 this intent and the **managedTransaction** implementation policy of the component sending or receiving
1760 the transacted OneWay invocation are summarized below in Table 9-1.

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transacted/immediate intent	managedTransaction (client or service implementation intent)	Results
transactedOneWay	managedTransaction.global	OneWay interaction (either client message enqueue or target service dequeue) is committed as part of the global transaction.
transactedOneWay	managedTransaction.local or noManagedTransaction	If a transactedOneWay intent is combined with the managedTransaction.local or noManagedTransaction implementation intents for either a reference or a service then an error MUST be raised during deployment. [POL90027]
immediateOneWay	Any value of managedTransaction	The OneWay interaction occurs immediately and is not transacted.
<absent>	Any value of managedTransaction	Runtime-specific behavior. The SCA runtime can send or receive a OneWay message immediately or as part of any sender/receiver transaction.

1762 Table 9-1 Transacted OneWay interaction intent

1763

1764 The formal definitions of these intents are in the [Intent Definitions appendix](#).

1765 9.5.3 Asynchronous Implementations

1766 SCA defines an intent called **asyncInvocation** that enables an SCA service to indicate that its
 1767 request/response operations are long running and therefore interactions with those operations really need
 1768 to be done asynchronously. The use of **asyncInvocation** with oneway operations is meaningless
 1769 because the one way operation is already asynchronous. Operations which implement this long running
 1770 behavior can make use of any transaction implementation intents on a component implementation or on
 1771 SCA references. However, implementations of operations which have long-running behaviour need to be
 1772 careful in how they use ACID transactions, which in general are not suited to operating over extended
 1773 time periods. Also see section 9.6.4 Interaction intents with asynchronous implementations for additional
 1774 considerations on the use of the **asyncInvocation** intent with transactions.
 1775

1776 9.6 Transaction interaction policies

1777 The mutually exclusive **propagatesTransaction** and **suspendsTransaction** intents can be attached
 1778 either to an interface (e.g. Java annotation or WSDL attribute) or explicitly to an sca:service and
 1779 sca:reference XML element to describe how any client transaction context will be made available and
 1780 used by the target service component. Section 9.6.1 considers how these intents apply to service
 1781 elements and Section 9.6.2 considers how these intents apply to reference elements.

1782 The formal definitions of these intents are in the [Intent Definitions appendix](#).

1783 9.6.1 Handling Inbound Transaction Context

1784 The mutually exclusive **propagatesTransaction** and **suspendsTransaction** intents can be attached to
 1785 an sca:service XML element to describe how a propagated transaction context is handled by the SCA
 1786 runtime, prior to dispatching a service component. If the service requester is running within a transaction

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1787 and the service interaction policy is to propagate that transaction, then the primary business effects of the
1788 provider's operation are coordinated as part of the client's transaction – if the client rolls back its
1789 transaction, then work associated with the provider's operation will also be rolled back. This allows clients
1790 to know that no compensation business logic is necessary since transaction rollback can be used.

1791 These intents specify a contract that has to be implemented by the SCA runtime. This aspect of a
1792 service component is most likely captured during application design. The **propagatesTransaction** or
1793 **suspendsTransaction** intent can be attached to sca:service elements and their children. The intents are
1794 defined as follows:

1795 • **propagatesTransaction** – A service marked with propagatesTransaction MUST be dispatched under
1796 any propagated (client) transaction. [POL90015] Use of the **propagatesTransaction** intent on a
1797 service implies that the service binding MUST be capable of receiving a transaction context.
1798 [POL90016] However, it is important to understand that some binding/policySet combinations that
1799 provide this intent for a service will *need* the client to propagate a transaction context.
1800 In SCA terms, for a reference wired to such a service, this implies that the reference has to use either
1801 the **propagatesTransaction** intent or a binding/policySet combination that does propagate a
1802 transaction. If, on the other hand, the service does not *need* the client to provide a transaction (even
1803 though it has the *capability* of joining the client's transaction), then some care is needed in the
1804 configuration of the service. One approach to consider in this case is to use two distinct bindings on
1805 the service, one that uses the **propagatesTransaction** intent and one that does not - clients that do
1806 not propagate a transaction would then wire to the service using the binding without the
1807 **propagatesTransaction** intent specified.

1808 • **suspendsTransaction** – A service marked with suspendsTransaction MUST NOT be dispatched
1809 under any propagated (client) transaction. [POL90017]

1810 The absence of either interaction intent leads to runtime-specific behavior; the client is unable to
1811 determine from transaction intents whether its transaction will be joined.

1812 The SCA runtime MUST ignore the propagatesTransaction intent for OneWay methods. [POL90025]

1813 These intents are independent from the implementation's **managedTransaction** intent and provides no
1814 information about the implementation's transaction environment.

1815 The combination of these service interaction policies and the **managedTransaction** implementation
1816 policy of the containing component completely describes the transactional behavior of an invoked service,
1817 as summarized in Table 9-2:

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service interaction intent	managedTransaction (component implementation intent)	Results
propagatesTransaction	managedTransaction.global	Component runs in propagated transaction if present, otherwise a new global transaction. This combination is used for the managed, shared global transaction pattern described in Common Transaction Patterns. This is equivalent to the managedSharedTransaction intent defined in section 9.6.3.
propagatesTransaction	managedTransaction.local or noManagedTransaction	A service MUST NOT be marked with "propagatesTransaction" if the component is marked with "managedTransaction.local" or with "noManagedTransaction" [POL90019]
suspendsTransaction	managedTransaction.global	Component runs in a new global transaction
suspendsTransaction	managedTransaction.local	Component runs in a managed local transaction containment. This combination is used for the managed, local transaction pattern described in Common Transaction Patterns. This is the default behavior for a runtime that does not support global transactions.
suspendsTransaction	noManagedTransaction	Component is responsible for managing its own local transactional resources.

1819 Table 9-2 Combining service transaction intents

1820

1821 Note - the absence of either interaction or implementation intents leads to runtime-specific behavior. A
 1822 runtime that supports global transaction coordination can choose to provide a default behavior that is the
 1823 managed, shared global transaction pattern.

1824 **9.6.2 Handling Outbound Transaction Context**

1825 The mutually exclusive *propagatesTransaction* and *suspendsTransaction* intents can also be attached
 1826 to an sca:reference XML element to describe whether any client transaction context is propagated to a
 1827 target service when a synchronous interaction occurs through the reference. These intents specify a
 1828 contract that has to be implemented by the SCA runtime. This aspect of a service component is most
 1829 likely captured during application design.

1830 Either the *propagatesTransaction* or *suspendsTransaction* intent can be attached to sca:service
 1831 elements and their children. The intents are defined as defined in Section 9.6.1.

1832 When used as a reference interaction intent, the meaning of the qualifiers is as follows:

- 1833 • **propagatesTransaction** – When a reference is marked with propagatesTransaction, any transaction
 1834 context under which the client runs **MUST** be propagated when the reference is used for a request-
 1835 response interaction [POL90020] The binding of a reference marked with propagatesTransaction has

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1836 to be capable of propagating a transaction context. The reference needs to be wired to a service that
 1837 can join the client's transaction. For example, any service with an intent that @requires
 1838 **propagatesTransaction** can always join a client's transaction. The reference consumer can then be
 1839 designed to rely on the work of the target service being included in the caller's transaction.

1840 • **suspendsTransaction** – When a reference is marked with **suspendsTransaction**, any transaction
 1841 context under which the client runs MUST NOT be propagated when the reference is used.
 1842 [POL90022] The reference consumer can use this intent to ensure that the work of the target service
 1843 is not included in the caller's transaction. .

1844 • The absence of either interaction intent leads to runtime-specific behavior. The SCA runtime can
 1845 choose whether or not to propagate any client transaction context to the referenced service,
 1846 depending on the SCA runtime capability.

1847 These intents are independent from the client's **managedTransaction** implementation intent. The
 1848 combination of the interaction intent of a reference and the **managedTransaction** implementation policy
 1849 of the containing component completely describes the transactional behavior of a client's invocation of a
 1850 service. Table 9-3 summarizes the results of the combination of either of these interaction intents with the
 1851 **managedTransaction** implementation policy of the containing component.

1852

reference interaction intent	managedTransaction (client implementation intent)	Results
propagatesTransaction	managedTransaction.global	Target service runs in the client's transaction. This combination is used for the managed, shared global transaction pattern described in Common Transaction Patterns.
propagatesTransaction	managedTransaction.local or noManagedTransaction	A reference MUST NOT be marked with propagatesTransaction if component is marked with "ManagedTransaction.local" or with "noManagedTransaction" [POL90023]
suspendsTransaction	Any value of managedTransaction	The target service will not run under the same transaction as any client transaction. This combination is used for the managed, local transaction pattern described in Common Transaction Patterns.

1853 Table 9-3 Transaction propagation reference intents

1854

1855 Note - the absence of either interaction or implementation intents leads to runtime-specific behavior. A
 1856 runtime that supports global transaction coordination can choose to provide a default behavior that is the
 1857 managed, shared global transaction pattern.

1858 Table 9-4 shows the valid combination of interaction and implementation intents on the client and service
 1859 that result in a single global transaction being used when a client invokes a service through a reference.

1860

managedTransaction (client implementation intent)	reference interaction intent	service interaction intent	managedTransaction (service implementation intent)

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managedTransaction.global	propagatesTransaction	propagatesTransaction	managedTransaction.global
---------------------------	-----------------------	-----------------------	---------------------------

1861 *Table 9-4 Intents for end-to-end transaction propagation*

1862
 1863 **Transaction context MUST NOT be propagated on OneWay messages.** [POL90024] The SCA runtime
 1864 ignores **propagatesTransaction** for OneWay operations.

1865 9.6.3 Combining implementation and interaction intents

1866 The **managed, local transaction pattern** can be configured quite easily by combining the
 1867 managedTransaction.global intent with the propagatesTransaction intent. This is illustrated in Section 9.2
 1868 Common Transaction Patterns. In order to enable easier configuration of this pattern, a profile intent
 1869 called managedSharedTransaction is defined as in section C.1 Intent Definitions.

1870 9.6.4 Interaction intents with asynchronous implementations

1871 SCA defines an intent called **asyncInvocation** that enables an SCA service to indicate that its
 1872 request/response operations are long running and therefore interactions with the service really need to be
 1873 done asynchronously. Any of the transaction interaction intents can be used with an asynchronous
 1874 implementation except for the **propagatesTransaction** intent. Due to the long running nature of this kind
 1875 of implementation, inbound global transaction context cannot be propagated to the component
 1876 implementation. As a result, the **propagatesTransaction** intent is mutually exclusive with the
 1877 **asyncInvocation** intent. **The asyncInvocation intent and the propagatesTransaction intent MUST**
 1878 **NOT be applied to the same service or reference operation.** [POL90030] When the **asyncInvocation**
 1879 **intent is applied to an SCA service, the SCA runtime MUST behave as if the suspendsTransaction**
 1880 **intent is also applied to the service.** [POL90031]

1882 9.6.5 Web Services Binding for propagatesTransaction policy

1883 Snippet 9-1 shows a policySet that provides the **propagatesTransaction** intent and applies to a Web
 1884 service binding (binding.ws). When used on a service, this policySet would require the client to send a
 1885 transaction context using the mechanisms described in the [Web Services Atomic Transaction](#) [WS-
 1886 AtomicTransaction] specification.

```

1887
1888 <policySet name="JoinsTransactionWS" provides="sca:propagatesTransaction"
1889           appliesTo="//sca:binding.ws">
1890   <wsp:Policy>
1891     <wsat:ATAssertion
1892       xmlns:wsat="http://docs.oasis-open.org/ws-tx/wsat/2006/06"/>
1893   </wsp:Policy>
1894 </policySet>

```

1895 *Snippet 9-1: Example policySet Providing propagatesTransaction*

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10 Miscellaneous Intents

1897
1898

The following are standard intents that apply to bindings and are not related to either security, reliable messaging or transactionality:

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- **SOAP** – The SOAP intent specifies that the SOAP messaging model is used for delivering messages. It does not require the use of any specific transport technology for delivering the messages, so for example, this intent can be supported by a binding that sends SOAP messages over HTTP, bare TCP or even JMS. If the intent is attached in an unqualified form then any version of SOAP is acceptable. Standard mutually exclusive qualified intents also exist for SOAP.1_1 and SOAP.1_2, which specify the use of versions 1.1 or 1.2 of SOAP respectively. When SOAP is present, an SCA Runtime MUST use the SOAP messaging model to deliver messages. [POL100001] When a SOAP intent is qualified with 1_1 or 1_2, then SOAP version 1.1 or SOAP version 1.2 respectively MUST be used to deliver messages. [POL100002]

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- **JMS** – The JMS intent does not specify a wire-level transport protocol, but instead requires that whatever binding technology is used, the messages are able to be delivered and received via the JMS API. When JMS is present, an SCA Runtime MUST ensure that the binding used to send and receive messages supports the JMS API. [POL100003]

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- **noListener** – This intent can only be used within the @requires attribute of a reference. The noListener intent MUST only be declared on a @requires attribute of a reference. [POL100004] It states that the client is not able to handle new inbound connections. It requires that the binding and callback binding be configured so that any response (or callback) comes either through a back channel of the connection from the client to the server or by having the client poll the server for messages. When noListener is present, an SCA Runtime MUST not establish any connection from a service to a client. [POL100005] An example policy assertion that would guarantee this is a WS-Policy assertion that applies to the <binding.ws> binding, which requires the use of WS-Addressing with anonymous responses (e.g. <wsaw:Anonymous>required</wsaw:Anonymous>” – see <http://www.w3.org/TR/ws-addr-wsdl/#anonelement>).

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- **asyncInvocation** – This intent can be attached to a request/response operation or a complete interface, indicating that the request/response operation(s) are long-running [SCA-Assembly]. The SCA Runtime MUST ignore the asyncInvocation intent for one way operations. [POL100007] It is also possible for a service to set the asyncInvocation intent when using an interface which is not marked with the asyncInvocation intent. This can be useful when reusing an existing interface definition that does not contain SCA information.

1928
1929
1930
1931

- **EJB** - The EJB intent specifies that whatever wire-level transport technology is specified the messages are able to be delivered and received via the EJB API. When EJB is present, an SCA Runtime MUST ensure that the binding used to send and receive messages supports the EJB API. [POL100006]

1932

The formal definitions of these intents are in the [Intent Definitions appendix](#).

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1933

11 Conformance

1934 The XML schema available at the namespace URI, defined by this specification, is considered to be
1935 authoritative and takes precedence over the XML Schema defined in the appendix of this document.

1936 **An SCA runtime MUST reject a composite file that does not conform to the sca-policy-1.1.xsd schema.**
1937 [\[POL110001\]](#)

1938 An implementation that claims to conform to this specification MUST meet the following conditions:

- 1939 1. The implementation MUST conform to the SCA Assembly Model Specification [Assembly].
- 1940 2. SCA implementations MUST recognize the intents listed in Appendix B.1 of this specification. An
1941 implementationType / bindingType / collection of policySets that claims to implement a specific intent
1942 MUST process that intent in accord with any relevant Conformance Items in Appendix C related to
1943 the intent and the SCA Runtime options selected.
- 1944 3. With the exception of 2, the implementation MUST comply with all statements in [Appendix C:](#)
1945 Conformance Items related to an SCA Runtime, notably all MUST statements have to be
1946 implemented.
- 1947

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A Defining the Deployed Composites Infoset

The @attachTo attribute of a policySet or the @attachTo attribute of a <externalAttachment/> element is an XPath1.0 expression identifying SCA elements to which intents and/or policySets are attached. The XPath applies to the **Deployed Composites Infoset** for the SCA domain.

The Deployed Composites Infoset is constructed from all the deployed SCA composite files [SCA-Assembly] in the Domain, with the special characteristics:

1. The Domain is treated as a special composite, with a blank name - ""
2. The @attachTo/@ppliesTo XPath expression is evaluated against the Deployed Composite Infoset following the deployment of a deployment composite. Where one composite includes one or more other composites, it is the including composite which is addressed by the XPath and its contents are the result of preprocessing all of the include elements
3. Where the intent or policySet is intended to be specific to a particular component, the structuralURI [SCA-Assembley] of the component is used along with the URIRef() XPath function to attach a intent/policySet to a specific use of a nested component. The XPath expression can make use of the unique structuralURI to indicate specific use instances, where different intents/policySets need to be used for those different instances.

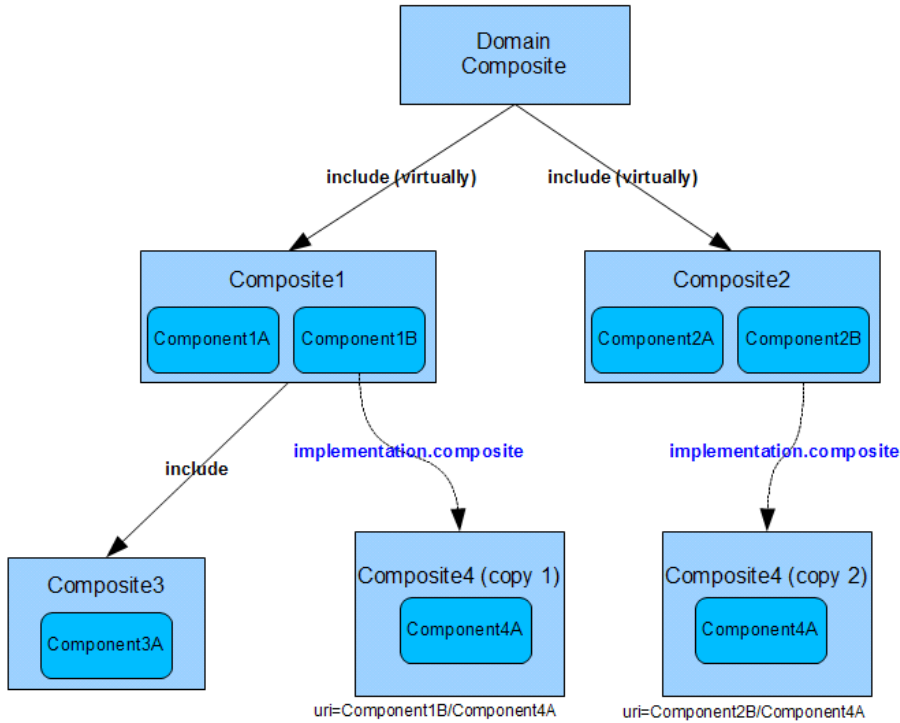
The XPath expression for the @attachTo attribute can make use of a series of XPath functions which enable the expression to easily identify elements with specific characteristics that are not easily expressed with pure XPath. These functions enable:

- the identification of elements to which specific intents apply.
This permits the attachment of a policySet to be linked to specific intents on the target element - for example, a policySet relating to encryption of messages can be targeted to services and references which have the **confidentiality** intent applied.
- the targeting of subelements of an interface, including operations and messages.
This permits the attachment of a intent/policySet to an individual operation or to an individual message within an interface, separately from the policies that apply to other operations or messages in the interface.
- the targeting of a specific use of a component, through its unique structuralURI [SCA-Assembly].
This permits the attachment of a intent/policySet to a specific use of a component in one context, that can be different from the policySet(s) that are applied to other uses of the same component.

Details of the available XPath functions is given in the section "[XPath Functions for the @attachTo Attribute](#)".

EXAMPLE:

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1983
1984 *Figure A-1 Example Domain Composite Infoset*

1985
1986 The SCA Domain in Figure A-1 has been constructed from the composites and components shown in the
1987 figure. Composite1 and Composite2 were deployed into the Domain as described in [SCA-Assembly].
1988 Composite3 is included in Composite1 using the SCA include mechanism described in [SCA-Assembly].
1989 Composite4 is used as an implementation of Components 1B and 2B. Following the deployment of all the
1990 composites, the Domain contains:

- 1991
- 3 Composites that can be addressed as part of the Deployed Composites InfoSet; Composite1, Composite2 and Composite4.
 - all the components shown in the diagram. Components 1A, 2A, 3A, 4A (twice) are leaf components.
- 1992
1993
1994

1995
1996 The following snippets show example usage of the @attachTo attribute and provide the outcome based
1997 on the Domain in Figure A-1.

1998
1999

```
1. //component[@name="Component4A"]
```

2000 *Snippet A-1: Example attachTo all Instances of a Name*

2001
2002 attach to both instances of Component4A

2003
2004

```
2. //component[URIRef( "Component2B/Component4A" ) ]
```

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2005 Snippet A-2: Example attachTo a Specific Instance via a Path

2006

2007 attach to the unique instance of Component4A when used by Component2B (Component2B is a
2008 component at the Domain level)

2009

2010 `3. //component[@name="Component3A"]/service[IntentRefs("intent1")]`

2011 Snippet A-3: Example attachTo Instances with an intent

2012

2013 attach to the services of Component3A which have the intent "intent1" applied

2014

2015 `4. //component/binding.ws`

2016 Snippet A-4: Example attachTo Instances with a binding

2017

2018 attach to the web services binding of all components with a service or reference with a Web services
2019 binding

2020

2021 `5. /composite[@name=" "]/component[@name="Component1A"]`

2022 Snippet A-5: Example attachTo a Specific Instance via Path and Name

2023

2024 attach to Component1A at the Domain level

2025

2026

2027 A.1 XPath Functions for the @attachTo Attribute

2028 This section defines utility functions that can be used in XPath expressions where otherwise it would be
2029 difficult to write the XPath expression to identify the elements concerned.

2030 This particularly applies in SCA to Interfaces and the child parts of interfaces (operations and messages).
2031 XPath Functions are defined below for the following:

- 2032 • Picking out a specific interface
- 2033 • Picking out a specific operation in an interface
- 2034 • Picking out a specific message in an operation in an interface
- 2035 • Picking out artifacts with specific intents

2036 A.1.1 Interface Related Functions

2037 InterfaceRef(InterfaceName)

2038 picks out an interface identified by InterfaceName

2039 OperationRef(InterfaceName/OperationName)

2040 picks out the operation OperationName in the interface InterfaceName

2041 MessageRef(InterfaceName/OperationName/MessageName)

2042 picks out the message MessageName in the operation OperationName in the interface
2043 InterfaceName.

- 2044 • "*" can be used for wildcarding of any of the names.

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2045 The interface is treated as if it is a WSDL interface (for other interface types, they are treated as if
2046 mapped to WSDL using their regular mapping rules).

2047 Examples of the Interface functions:

2048

```
2049 InterfaceRef( "MyInterface" )
```

2050 *Snippet A-6: Example use of InterfaceRef*

2051

2052 picks out an interface with the name "MyInterface"

2053

```
2054 OperationRef( "MyInterface/MyOperation" )
```

2055 *Snippet A-7: Example use of OperationRef with a Path*

2056

2057 picks out the operation named "MyOperation" within the interface named "MyInterface"

2058

```
2059 OperationRef( "*/MyOperation" )
```

2060 *Snippet A-8: Example use of OperationRef without a Path*

2061

2062 picks out the operation named "MyOperation" from any interface

2063

```
2064 MessageRef( "MyInterface/MyOperation/MyMessage" )
```

2065 *Snippet A-9: Example use of MessageRef with a Path*

2066

2067 picks out the message named "MyMessage" from the operation named "MyOperation" within the interface
2068 named "MyInterface"

2069

```
2070 MessageRef( "*/*/MyMessage" )
```

2071 *Snippet A-10: Example use of MessageRef with a Path with Wildcards*

2072

2073 picks out the message named "MyMessage" from any operation in any interface

2074 **A.1.2 Intent Based Functions**

2075 For the following intent-based functions, it is the total set of intents which apply to the artifact which are
2076 examined by the function, including directly or externally attached intents plus intents acquired from the
2077 structural hierarchy and from the implementation hierarchy.

2078

2079 **IntentRefs(IntentList)**

2080 picks out an element where the intents applied match the intents specified in the IntentList:

2081

```
2082 IntentRefs( "intent1" )
```

2083 *Snippet A-11: Example use of IntentRef*

2084

2085 picks out an artifact to which intent named "intent1" is attached

2086
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```
IntentRefs( "intent1 intent2" )
```

Snippet A-12: Example use of IntentRef with Multiple intents

picks out an artifact to which intents named "intent1" AND "intent2" are attached

```
IntentRefs( "intent1 !intent2" )
```

Snippet A-13: Example use of IntentRef with Not Operator

picks out an artifact to which intent named "intent1" is attached but NOT the intent named "intent2"

A.1.3 URI Based Function

The URIRef function is used to pick out a particular use of a nested component – i.e. where some Domain level component is implemented using a composite implementation, which in turn has one or more components implemented with the composite (and so on to an arbitrary level of nesting):

URIRef(URI)

picks out the particular use of a component identified by the structuralURI string URI.

For a full description of structuralURIs, see the SCA Assembly specification [\[SCA-Assembly\]](#).

Example:

```
URIRef( "top_comp_name/middle_comp_name/lowest_comp_name" )
```

Snippet A-15: Example use of URIRef

picks out the particular use of a component – where component lowest_comp_name is used within the implementation of middle_comp_name within the implementation of the top-level (Domain level) component top_comp_name.

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2112 B Schemas

2113 B.1 sca-policy.xsd

```
2114 <?xml version="1.0" encoding="UTF-8"?>
2115 <!-- Copyright(C) OASIS(R) 2005,2010. All Rights Reserved.
2116 OASIS trademark, IPR and other policies apply. -->
2117 <schema xmlns="http://www.w3.org/2001/XMLSchema"
2118 targetNamespace="http://docs.oasis-open.org/ns/opencsa/sca/200912"
2119 xmlns:sca="http://docs.oasis-open.org/ns/opencsa/sca/200912"
2120 xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy"
2121 elementFormDefault="qualified">
2122
2123 <include schemaLocation="sca-core-1.1-cd05.xsd"/>
2124 <import namespace="http://www.w3.org/ns/ws-policy"
2125 schemaLocation="http://www.w3.org/2007/02/ws-policy.xsd"/>
2126
2127 <element name="intent" type="sca:Intent"/>
2128 <complexType name="Intent">
2129 <sequence>
2130 <element name="description" type="string" minOccurs="0"
2131 maxOccurs="1" />
2132 <element name="qualifier" type="sca:IntentQualifier"
2133 minOccurs="0" maxOccurs="unbounded" />
2134 <any namespace="##other" processContents="lax"
2135 minOccurs="0" maxOccurs="unbounded"/>
2136 </sequence>
2137 <attribute name="name" type="NCName" use="required"/>
2138 <attribute name="constrains" type="sca:listOfQNames"
2139 use="optional"/>
2140 <attribute name="requires" type="sca:listOfQNames"
2141 use="optional"/>
2142 <attribute name="excludes" type="sca:listOfQNames"
2143 use="optional"/>
2144 <attribute name="mutuallyExclusive" type="boolean"
2145 use="optional" default="false"/>
2146 <attribute name="intentType"
2147 type="sca:InteractionOrImplementation"
2148 use="optional" default="interaction"/>
2149 <anyAttribute namespace="##other" processContents="lax"/>
2150 </complexType>
2151
2152 <complexType name="IntentQualifier">
2153 <sequence>
2154 <element name="description" type="string" minOccurs="0"
2155 maxOccurs="1" />
2156 <any namespace="##other" processContents="lax" minOccurs="0"
2157 maxOccurs="unbounded"/>
2158 </sequence>
2159 <attribute name="name" type="NCName" use="required"/>
2160 <attribute name="default" type="boolean" use="optional"
2161 default="false"/>
2162 </complexType>
2163
2164 <element name="requires">
2165 <complexType>
2166 <sequence minOccurs="0" maxOccurs="unbounded">
2167 <any namespace="##other" processContents="lax"/>
2168 </sequence>
```

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```

2169         <attribute name="intents" type="sca:listOfQNames"
2170             use="required"/>
2171         <anyAttribute namespace="##other" processContents="lax"/>
2172     </complexType>
2173 </element>
2174
2175 <element name="externalAttachment">
2176     <complexType>
2177         <sequence minOccurs="0" maxOccurs="unbounded">
2178             <any namespace="##other"
2179                 processContents="lax"/>
2180         </sequence>
2181         <attribute name="intents" type="sca:listOfQNames"
2182             use="optional"/>
2183         <attribute name="policySets" type="sca:listOfQNames"
2184             use="optional"/>
2185         <attribute name="attachTo" type="string"
2186             use="required"/>
2187         <anyAttribute namespace="##other"
2188             processContents="lax"/>
2189     </complexType>
2190 </element>
2191
2192 <element name="policySet" type="sca:PolicySet"/>
2193 <complexType name="PolicySet">
2194     <choice minOccurs="0" maxOccurs="unbounded">
2195         <element name="policySetReference"
2196             type="sca:PolicySetReference"/>
2197         <element name="intentMap" type="sca:IntentMap"/>
2198         <any namespace="##other" processContents="lax"/>
2199     </choice>
2200     <attribute name="name" type="NCName" use="required"/>
2201     <attribute name="provides" type="sca:listOfQNames"/>
2202     <attribute name="appliesTo" type="string" use="optional"/>
2203     <attribute name="attachTo" type="string" use="optional"/>
2204     <anyAttribute namespace="##other" processContents="lax"/>
2205 </complexType>
2206
2207 <element name="policySetAttachment">
2208     <complexType>
2209         <sequence minOccurs="0" maxOccurs="unbounded">
2210             <any namespace="##other" processContents="lax"/>
2211         </sequence>
2212         <attribute name="name" type="QName" use="required"/>
2213         <anyAttribute namespace="##other" processContents="lax"/>
2214     </complexType>
2215 </element>
2216
2217 <complexType name="PolicySetReference">
2218     <attribute name="name" type="QName" use="required"/>
2219     <anyAttribute namespace="##other" processContents="lax"/>
2220 </complexType>
2221
2222 <complexType name="IntentMap">
2223     <choice minOccurs="1" maxOccurs="unbounded">
2224         <element name="qualifier" type="sca:Qualifier"/>
2225         <any namespace="##other" processContents="lax"/>
2226     </choice>
2227     <attribute name="provides" type="QName" use="required"/>
2228     <anyAttribute namespace="##other" processContents="lax"/>
2229 </complexType>
2230
2231 <complexType name="Qualifier">

```

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```
<sequence minOccurs="0" maxOccurs="unbounded">  
  <any namespace="##other" processContents="lax"/>  
</sequence>  
<attribute name="name" type="string" use="required"/>  
<anyAttribute namespace="##other" processContents="lax"/>  
</complexType>  
  
<simpleType name="listOfNCNames">  
  <list itemType="NCName"/>  
</simpleType>  
  
<simpleType name="InteractionOrImplementation">  
  <restriction base="string">  
    <enumeration value="interaction"/>  
    <enumeration value="implementation"/>  
  </restriction>  
</simpleType>  
</schema>
```

2251 Snippet B-1SCA Policy Schema

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2252

C XML Files

2253 This appendix contains normative XML files that are defined by this specification.

C.1 Intent Definitions

2255 Intent definitions are contained within a Definitions file called sca-policy-1.1-intents-definitions.xml, which
2256 contains a <definitions/> element as follows:

```

2257 <?xml version="1.0" encoding="UTF-8"?>
2258 <!-- Copyright(C) OASIS(R) 2005,2009. All Rights Reserved.
2259 OASIS trademark, IPR and other policies apply. -->
2260 <sca:definitions xmlns:sca="http://docs.oasis-open.org/ns/opencsa/sca/200912"
2261 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
2262 targetNamespace="http://docs.oasis-open.org/ns/opencsa/sca/200912">
2263
2264 <!-- Security related intents -->
2265 <sca:intent name="serverAuthentication" constrains="sca:binding"
2266 intentType="interaction">
2267 <sca:description>
2268 Communication through the binding requires that the
2269 server is authenticated by the client
2270 </sca:description>
2271 <sca:qualifier name="transport" default="true"/>
2272 <sca:qualifier name="message"/>
2273 </sca:intent>
2274
2275 <sca:intent name="clientAuthentication" constrains="sca:binding"
2276 intentType="interaction">
2277 <sca:description>
2278 Communication through the binding requires that the
2279 client is authenticated by the server
2280 </sca:description>
2281 <sca:qualifier name="transport" default="true"/>
2282 <sca:qualifier name="message"/>
2283 </sca:intent>
2284
2285 <sca:intent name="authentication"
2286 requires="sca:clientAuthentication">
2287 <sca:description>
2288 A convenience intent to help migration
2289 </sca:description>
2290 </sca:intent>
2291
2292 <sca:intent name="mutualAuthentication"
2293 requires="sca:clientAuthentication sca:serverAuthentication">
2294 <sca:description>
2295 Communication through the binding requires that the
2296 client and server to authenticate each other
2297 </sca:description>
2298 </sca:intent>
2299
2300 <sca:intent name="confidentiality" constrains="sca:binding"
2301 intentType="interaction">
2302 <sca:description>
2303 Communication through the binding prevents unauthorized
2304 users from reading the messages
2305 </sca:description>
2306 <sca:qualifier name="transport" default="true"/>

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```
<sca:qualifier name="message" />
</sca:intent>

<sca:intent name="integrity" constrains="sca:binding"
intentType="interaction">
  <sca:description>
    Communication through the binding prevents tampering
    with the messages sent between the client and the service.
  </sca:description>
  <sca:qualifier name="transport" default="true" />
  <sca:qualifier name="message" />
</sca:intent>

<sca:intent name="authorization" constrains="sca:implementation"
intentType="implementation">
  <sca:description>
    Ensures clients are authorized to use services.
  </sca:description>
</sca:intent>

<!-- Reliable messaging related intents -->
<sca:intent name="atLeastOnce" constrains="sca:binding"
intentType="interaction">
  <sca:description>
    This intent is used to indicate that a message sent
    by a client is always delivered to the component.
  </sca:description>
</sca:intent>

<sca:intent name="atMostOnce" constrains="sca:binding"
intentType="interaction">
  <sca:description>
    This intent is used to indicate that a message that was
    successfully sent by a client is not delivered more than
    once to the component.
  </sca:description>
</sca:intent>

<sca:intent name="exactlyOnce" requires="sca:atLeastOnce
sca:atMostOnce"
constrains="sca:binding" intentType="interaction">
  <sca:description>
    This profile intent is used to indicate that a message sent
    by a client is always delivered to the component. It also
    indicates that duplicate messages are not delivered to the
    component.
  </sca:description>
</sca:intent>

<sca:intent name="ordered" constrains="sca:binding"
intentType="interaction">
  <sca:description>
    This intent is used to indicate that all the messages are
    delivered to the component in the order they were sent by
    the client.
  </sca:description>
</sca:intent>

<!-- Transaction related intents -->
<sca:intent name="managedTransaction"
  excludes="sca:noManagedTransaction"
  mutuallyExclusive="true" constrains="sca:implementation"
```

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```
intentType="implementation">
  <sca:description>
    A managed transaction environment is necessary in order to
    run the component. The specific type of managed transaction
    needed is not constrained.
  </sca:description>
  <sca:qualifier name="global" default="true">
    <sca:description>
      For a component marked with managedTransaction.global
      a global transaction needs to be present before dispatching
      any method on the component - using any transaction
      propagated from the client or else beginning and completing
      a new transaction.
    </sca:description>
  </sca:qualifier>
  <sca:qualifier name="local">
    <sca:description>
      A component marked with managedTransaction.local needs to
      run within a local transaction containment (LTC) that
      is started and ended by the SCA runtime.
    </sca:description>
  </sca:qualifier>
</sca:intent>

<sca:intent name="noManagedTransaction"
excludes="sca:managedTransaction"
constrains="sca:implementation" intentType="implementation">
  <sca:description>
    A component marked with noManagedTransaction needs to run without
    a managed transaction, under neither a global transaction nor
    an LTC. A transaction propagated to the hosting SCA runtime
    is not joined by the hosting runtime on behalf of a
    component marked with noManagedtransaction.
  </sca:description>
</sca:intent>

<sca:intent name="transactedOneWay" excludes="sca:immediateOneWay"
constrains="sca:binding" intentType="implementation">
  <sca:description>
    For a reference marked as transactedOneWay any OneWay invocation
    messages are transacted as part of a client global
    transaction.
    For a service marked as transactedOneWay any OneWay invocation
    message are received from the transport binding in a
    transacted fashion, under the service's global transaction.
  </sca:description>
</sca:intent>

<sca:intent name="immediateOneWay" excludes="sca:transactedOneWay"
constrains="sca:binding" intentType="implementation">
  <sca:description>
    For a reference indicates that any OneWay invocation messages
    are sent immediately regardless of any client transaction.
    For a service indicates that any OneWay invocation is
    received immediately regardless of any target service
    transaction.
  </sca:description>
</sca:intent>

<sca:intent name="propagatesTransaction"
excludes="sca:suspendsTransaction"
constrains="sca:binding" intentType="interaction">
  <sca:description>
```

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```
A service marked with propagatesTransaction is dispatched
under any propagated (client) transaction and the service binding
needs to be capable of receiving a transaction context.
A reference marked with propagatesTransaction propagates any
transaction context under which the client runs when the
reference is used for a request-response interaction and the
binding of a reference marked with propagatesTransaction needs to
be capable of propagating a transaction context.
</sca:description>
</sca:intent>

<sca:intent name="suspendsTransaction"
  excludes="sca:propagatesTransaction"
  constrains="sca:binding" intentType="interaction">
  <sca:description>
    A service marked with suspendsTransaction is not dispatched
    under any propagated (client) transaction.
    A reference marked with suspendsTransaction does not propagate
    any transaction context under which the client runs when the
    reference is used.
  </sca:description>
</sca:intent>

<sca:intent name="managedSharedTransaction"
  requires="sca:managedTransaction.global
sca:propagatesTransaction">
  <sca:description>
    Used to indicate that the component requires both the
    managedTransaction.global and the propagatesTransactions
    intents
  </sca:description>
</sca:intent>

<!-- Miscellaneous intents -->
<sca:intent name="asyncInvocation" excludes="sca:propagatesTransaction"
  constrains="sca:binding" intentType="interaction">
  <sca:description>
    Indicates that request/response operations for the
    interface of this wire are "long running" and must be
    treated as two separate message transmissions
  </sca:description>
</sca:intent>

<sca:intent name="EJB" constrains="sca:binding"
  intentType="interaction">
  <sca:description>
    Specifies that the EJB API is needed to communicate with
    the service or reference.
  </sca:description>
</sca:intent>

<sca:intent name="SOAP" constrains="sca:binding"
  intentType="interaction" mutuallyExclusive="true">
  <sca:description>
    Specifies that the SOAP messaging model is used for delivering
    messages.
  </sca:description>
  <sca:qualifier name="v1_1" default="true"/>
  <sca:qualifier name="v1_2"/>
</sca:intent>

<sca:intent name="JMS" constrains="sca:binding"
  intentType="interaction">
```

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<sca:description>
  Requires that the messages are delivered and received via the
  JMS API.
</sca:description>
</sca:intent>

<sca:intent name="noListener" constrains="sca:binding"
intentType="interaction">
  <sca:description>
    This intent can only be used on a reference. Indicates that the
    client is not able to handle new inbound connections. The binding
    and callback binding are configured so that any
    response or callback comes either through a back channel of the
    connection from the client to the server or by having the client
    poll the server for messages.
  </sca:description>
</sca:intent>
</sca:definitions>
```

2515 *Snippet C-1: SCA intent Definitions*

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D Conformance

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D.1 Conformance Targets

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The conformance items listed in the section below apply to the following conformance targets:

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- Document artifacts (or constructs within them) that can be checked statically.

2520

- SCA runtimes, which we may require to exhibit certain behaviors.

2521

D.2 Conformance Items

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This section contains a list of conformance items for the SCA Policy Framework specification.

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Conformance ID	Description
[129HPOL30001]	If the configured instance of a binding is in conflict with the intents and policy sets selected for that instance, the SCA runtime MUST raise an error.
[130HPOL30002]	The QName for an intent MUST be unique amongst the set of intents in the SCA Domain.
[135HPOL30004]	If an intent has more than one qualifier, one and only one MUST be declared as the default qualifier.
[134HPOL30005]	The name of each qualifier MUST be unique within the intent definition.
[138HPOL30006]	the name of a profile intent MUST NOT have a "." in it.
[139HPOL30007]	If a profile intent is attached to an artifact, all the intents listed in its @requires attribute MUST be satisfied as described in section 4.15.
[149HPOL30008]	When a policySet element contains a set of intentMap children, the value of the @provides attribute of each intentMap MUST correspond to an unqualified intent that is listed within the @provides attribute value of the parent policySet element.
[151HPOL30010]	For each qualifiable intent listed as a member of the @provides attribute list of a policySet element, there MUST be no more than one corresponding intentMap element that declares the unqualified form of that intent in its @provides attribute. In other words, each intentMap within a given policySet uniquely provides for a specific intent.
[153HPOL30011]	Following the inclusion of all policySet references, when a policySet element directly contains wsp:policyAttachment children or policies using extension elements, the set of policies specified as children MUST satisfy all the intents expressed using the @provides attribute value of the policySet element.
[154HPOL30013]	The set of intents in the @provides attribute of a referenced policySet MUST be a subset of the set of intents in the @provides attribute of the referencing policySet.

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[131HPOL30015]	Each QName in the @requires attribute MUST be the QName of an intent in the SCA Domain.
[133HPOL30016]	Each QName in the @excludes attribute MUST be the QName of an intent in the SCA Domain.
[141HPOL30017]	The QName for a policySet MUST be unique amongst the set of policySets in the SCA Domain.
[142HPOL30018]	The contents of @appliesTo MUST match the XPath 1.0 [XPAT] production Expr.
[143HPOL30019]	The contents of @attachTo MUST match the XPath 1.0 production Expr.
[150HPOL30020]	If a policySet specifies a qualifiable intent in the @provides attribute, and it provides an intentMap for the qualifiable intent then that intentMap MUST specify all possible qualifiers for that intent.
[152HPOL30021]	The @provides attribute value of each intentMap that is an immediate child of a policySet MUST be included in the @provides attribute of the parent policySet.
[137HPOL30024]	An SCA Runtime MUST include in the Domain the set of intent definitions contained in the Policy_Intents_Definitions.xml described in the appendix "Intent Definitions" of the SCA Policy specification.
[POL30025]	If only one qualifier for an intent is given it MUST be used as the default qualifier for the intent.
[162HPOL40001]	SCA implementations supporting both Direct Attachment and External Attachment mechanisms MUST ignore policy sets applicable to any given SCA element via the Direct Attachment mechanism when there exist policy sets applicable to the same SCA element via the External Attachment mechanism
The SCA runtime MUST raise an error if the @attachTo XPath expression resolves to an SCA <property> element, or any of its children.[POL40002]	The SCA runtime MUST raise an error if the @attachTo XPath expression resolves to an SCA <property> element, or any of its children.
[165HPOL40004]	A qualifiable intent expressed lower in the hierarchy can be qualified further up the hierarchy, in which case the qualified version of the intent MUST apply to the higher level element.
[166HPOL40005]	<p>The intents declared on elements higher in the structural hierarchy of a given element MUST be applied to the element EXCEPT</p> <ul style="list-style-type: none"> • if any of the inherited intents is mutually exclusive with an intent applied on the element, then the inherited intent MUST be ignored • if the overall set of intents from the element itself and from its structural hierarchy contains both an unqualified version and a qualified version of the same intent, the qualified version of the intent MUST be used.

Deleted: The SCA runtime MUST raise an error if the @attachTo XPath expression resolves to an SCA <property> element, or any of its children.[POL40002]

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- [170HPOL40006] If a component has any policySets attached to it (by any means), then any policySets attached to the componentType MUST be ignored.
- [181HPOL40007] Matching service/reference policies across the SCA Domain boundary MUST use WS-Policy compatibility (strict WS-Policy intersection) if the policies are expressed in WS-Policy syntax.
- [163HPOL40009] Any two intents applied to a given element MUST NOT be mutually exclusive
- [159HPOL40010] SCA runtimes MUST support at least one of the Direct Attachment and External Attachment mechanisms for policySet attachment.
- [160HPOL40011] SCA implementations supporting only the External Attachment mechanism MUST ignore the policy sets that are applicable via the Direct Attachment mechanism.
- [161HPOL40012] SCA implementations supporting only the Direct Attachment mechanism MUST ignore the policy sets that are applicable via the External Attachment mechanism.
- [164HPOL40014] The intents declared on elements lower in the implementation hierarchy of a given element MUST be applied to the element.
- [167HPOL40015] When combining implementation hierarchy and structural hierarchy policy data, Rule 1 MUST be applied BEFORE Rule 2.
- [171HPOL40016] When calculating the set of intents and set of policySets which apply to either a service element or to a reference element of a component, intents and policySets from the interface definition and from the interface declaration(s) MUST be applied to the service or reference element and to the binding element(s) belonging to that element.
- [197HPOL40017] If the required intent set contains a mutually exclusive pair of intents the SCA runtime MUST reject the document containing the element and raise an error.
- [198HPOL40018] All intents in the required intent set for an element MUST be provided by the directly provided intents set and the set of policySets that apply to the element, or else an error is raised.
- [172HPOL40019] The locations where interfaces are defined and where interfaces are declared in the componentType and in a component MUST be treated as part of the implementation hierarchy as defined in section "Attaching intents to SCA elements".
- [174HPOL40020] The QName of the bindingType MUST be unique amongst the set of bindingTypes in the SCA Domain.
- [175HPOL40021] A binding implementation MUST implement all the intents listed in the @alwaysProvides and @mayProvides attributes.
- [177HPOL40022] The SCA runtime MUST determine the compatibility of the policySets at each end of a wire using the compatibility rules of the policy language used for those policySets.
- [178HPOL40023] The policySets at each end of a wire MUST be incompatible if

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- they use different policy languages.
- [179HPOL40024] Where the policy language in use for a wire is WS-Policy, strict WS-Policy intersection MUST be used to determine policy compatibility.
- [180HPOL40025] In order for a reference to connect to a particular service, the policies of the reference MUST intersect with the policies of the service.
- [POL40027] Any intents attached to an interface definition artifact, such as a WSDL portType, MUST be added to the intents attached to the service or reference to which the interface definition applies. If no intents are attached to the service or reference then the intents attached to the interface definition artifact become the only intents attached to the service or reference.
- [POL40029] If the process of redeployment of intents, externalAttachments and/or policySets fails because one or more intents are left unsatisfied, an error MUST be raised.
- [POL40030] If the process of redeployment of intents, externalAttachments and/or policySets fails, the changed intents, externalAttachments and/or policySets MUST NOT be deployed and no change is made to deployed and running artifacts.
- [POL40031] When redeployment of intents, externalAttachments and policySets succeeds, the components whose policies are affected by the redeployment MAY have their policies updated by the SCA runtime dynamically without the need to stop and restart those components.
- [POL40032] Where components are updated by redeployment of intents, externalAttachments and policySets (their configuration is changed in some way, which includes changing the policies associated with a component), the new configuration MUST apply to all new instances of those components once the redeployment is complete.
- [POL40033] Where a component configuration is changed by the redeployment of intents, externalAttachments and policySets, the SCA runtime either MAY choose to maintain existing instances with the old configuration of the component, or the SCA runtime MAY choose to stop and discard existing instances of the component.
- [POL40034] During the deployment of SCA composites, first all <externalAttachment/> elements within the Domain MUST be evaluated to determine which intents are attached to elements in the newly deployed composite and then all policySets within the Domain with an @attachTo attribute or <externalAttachment> elements that attach policySets MUST be evaluated to determine which policySets are attached to elements in the newly deployed composite.
- [155HPOL40035] The contents of the @attachTo attribute of an externalAttachment element MUST match the XPath 1.0 production Expr.
- [199HPOL50001] The implementationType name attribute MUST be the QName of

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- an XSD global element definition used for implementation elements of that type.
- [POL70001] When *authorization* is present, an SCA Runtime MUST ensure that the client is authorized to use the service.
- [POL70009] When *confidentiality* is present, an SCA Runtime MUST ensure that only authorized entities can view the contents of a message.
- [203HPOL70010] When *integrity* is present, an SCA Runtime MUST ensure that the contents of a message are not altered.
- [205HPOL70011] When a *serverAuthentication*, *clientAuthentication*, *confidentiality* or *integrity* intent is qualified by *transport*, an SCA Runtime MUST delegate *serverAuthentication*, *clientAuthentication*, *confidentiality* and *integrity*, respectively, to the transport layer of the communication protocol.
- [206HPOL70012] When a *serverAuthentication*, *clientAuthentication*, *confidentiality* or *integrity* intent is qualified by *message*, an SCA Runtime MUST delegate *serverAuthentication*, *clientAuthentication*, *confidentiality* and *integrity*, respectively, to the message layer of the communication protocol.
- [201HPOL70013] When *serverAuthentication* is present, an SCA runtime MUST ensure that the server is authenticated by the client.
- [202HPOL70014] When *clientAuthentication* is present, an SCA runtime MUST ensure that the client is authenticated by the server.
- [207HPOL80001] When *atLeastOnce* is present, an SCA Runtime MUST deliver a message to the destination service implementation, and MAY deliver duplicates of a message to the service implementation.
- [208HPOL80002] When *atMostOnce* is present, an SCA Runtime MAY deliver a message to the destination service implementation, and MUST NOT deliver duplicates of a message to the service implementation.
- [209HPOL80003] When *ordered* is present, an SCA Runtime MUST deliver messages sent by a single source to a single destination service implementation in the order that the messages were sent by that source.
- [210HPOL80004] When *exactlyOnce* is present, an SCA Runtime MUST deliver a message to the destination service implementation and MUST NOT deliver duplicates of a message to the service implementation.
- [213HPOL90003] For a component marked with *managedTransaction.global*, the SCA runtime MUST ensure that a global transaction is present before dispatching any method on the component.
- [214HPOL90004] A component marked with *managedTransaction.local* MUST run within a local transaction containment (LTC) that is started and ended by the SCA runtime.
- [215HPOL90006] Local transactions MUST NOT be propagated outbound across remotable interfaces.

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[216HPOL90007]	A transaction that is propagated to the hosting SCA runtime MUST NOT be joined by the hosting runtime on behalf of a component marked with noManagedtransaction.
[218HPOL90008]	When a reference is marked as transactedOneWay, any OneWay invocation messages MUST be transacted as part of a client global transaction.
[219HPOL90009]	If the client component is not configured to run under a global transaction or if the binding does not support transactional message sending, then a reference MUST NOT be marked as transactedOneWay.
[220HPOL90010]	If a service is marked as transactedOneWay, any OneWay invocation message MUST be received from the transport binding in a transacted fashion, under the target service's global transaction.
[221HPOL90011]	If the component is not configured to run under a global transaction or if the binding does not support transactional message receipt, then a service MUST NOT be marked as transactedOneWay.
[222HPOL90012]	When applied to a reference indicates that any OneWay invocation messages MUST be sent immediately regardless of any client transaction.
[POL90013]	When applied to a service indicates that any OneWay invocation MUST be received immediately regardless of any target service transaction.
[POL90015]	A service marked with propagatesTransaction MUST be dispatched under any propagated (client) transaction.
[POL90016]	Use of the <i>propagatesTransaction</i> intent on a service implies that the service binding MUST be capable of receiving a transaction context.
[POL90017]	A service marked with suspendsTransaction MUST NOT be dispatched under any propagated (client) transaction.
[233HPOL90019]	A service MUST NOT be marked with "propagatesTransaction" if the component is marked with "managedTransaction.local" or with "noManagedTransaction"
[234HPOL90020]	When a reference is marked with propagatesTransaction, any transaction context under which the client runs MUST be propagated when the reference is used for a request-response interaction
[235HPOL90022]	When a reference is marked with suspendsTransaction, any transaction context under which the client runs MUST NOT be propagated when the reference is used.
[236HPOL90023]	A reference MUST NOT be marked with propagatesTransaction if component is marked with "ManagedTransaction.local" or with "noManagedTransaction"
[237HPOL90024]	Transaction context MUST NOT be propagated on OneWay messages.
[231HPOL90025]	The SCA runtime MUST ignore the propagatesTransaction intent for OneWay methods.

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[225HPOL90027]	If a transactedOneWay intent is combined with the managedTransaction.local or noManagedTransaction implementation intents for either a reference or a service then an error MUST be raised during deployment.
[POL90028]	The transactedOneWay intent MUST NOT be attached to a request/response operation.
[POL90029]	The immediateOneWay intent MUST NOT be attached to a request/response operation.
[POL90030]	The asyncInvocation intent and the propagatesTransaction intent MUST NOT be applied to the same service or reference operation.
[POL90031]	When the asyncInvocation intent is applied to an SCA service, the SCA runtime MUST behave as if the suspendsTransaction intent is also applied to the service.
[241HPOL100001]	When SOAP is present, an SCA Runtime MUST use the SOAP messaging model to deliver messages.
[242HPOL100002]	When a SOAP intent is qualified with 1_1 or 1_2 , then SOAP version 1.1 or SOAP version 1.2 respectively MUST be used to deliver messages.
[243HPOL100003]	When JMS is present, an SCA Runtime MUST ensure that the binding used to send and receive messages supports the JMS API.
[244HPOL100004]	The noListener intent MUST only be declared on a @requires attribute of a reference.
[245HPOL100005]	When noListener is present, an SCA Runtime MUST not establish any connection from a service to a client.
[248HPOL100006]	When EJB is present, an SCA Runtime MUST ensure that the binding used to send and receive messages supports the EJB API.
[POL100007]	The SCA Runtime MUST ignore the asyncInvocation intent for one way operations.
[250HPOL110001]	An SCA runtime MUST reject a composite file that does not conform to the sca-policy-1.1.xsd schema.

2524 Table D-1: SCA Policy Normative Statements

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E Acknowledgements

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F Revision History

2530 [optional; should not be included in OASIS Standards]

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Revision	Date	Editor	Changes Made
2	Nov 2, 2007	David Booz	Inclusion of OSOA errata and Issue 8
3	Nov 5, 2007	David Booz	Applied resolution of Issue 7, to Section 4.1 and 4.10. Fixed misc. typos/grammatical items.
4	Mar 10, 2008	David Booz	Inclusion of OSOA Transaction specification as Chapter 11. There are no textual changes other than formatting.
5	Apr 28 2008	Ashok Malhotra	Added resolutions to issues 17, 18, 24, 29, 37, 39 and 40,
6	July 7 2008	Mike Edwards	Added resolution for Issue 38
7	Aug 15 2008	David Booz	Applied Issue 26, 27
8	Sept 8 2008	Mike Edwards	Applied resolution for Issue 15
9	Oct 17 2008	David Booz	Various formatting changes Applied 22 – Deleted text in Ch 9 Applied 42 – In section 3.3 Applied 46 – Many sections Applied 52,55 – Many sections Applied 53 – In section 3.3 Applied 56 – In section 3.1 Applied 58 – Many sections
10	Nov 26	David Booz	Applied camelCase words from Liason Applied 54 – many sections Applied 59 – section 4.2, 4.4.2 Applied 60 – section 8.1 Applied 61 – section 4.10, 4.12 Applied 63 – section 9
11	Dec 10	Mike Edwards	Applied 44 - section 3.1, 3.2 (new), 5.0, A.1 Renamed file to sca-policy-1.1-spec-CD01-Rev11
12	Dec 25	Ashok Malhotra	Added RFC 2119 keywords Renamed file to sca-policy-1.1-spec-CD01-Rev12
13	Feb 06 2009	Mike Edwards, Eric	All changes accepted

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		Wells, Dave Booz	Revision of the RFC 2119 keywords and the set of normative statements - done in drafts a through g
14	Feb 10 2009	Mike Edwards	All changes accepted, comments removed.
15	Feb 10 2009	Mike Edwards	Issue 64 - Sections A1, B, 10, 9, 8
16	Feb 12, 2009	Ashok Malhotra	Issue 5 The single sca namespace is listed on the title page. Issue 32 clientAuthentication and serverAuthentication Issue 35 Conformance targets added to Appendix C Issue 48 Transaction defaults are not optional Issue 66 Tighten schema for intent Issue 67 Remove 'conversational'
17	Feb 16, 2009	Dave Booz	Issues 57, 69, 70, 71
CD02	Feb 21, 2009	Dave Booz	Editorial changes to make a CD
CD02-rev1	April 7, 2009	Dave Booz	Applied 72, 74,75,77
CD02-rev2	July 21, 2009	Dave Booz	Applied 81,84,85,86,95,96,98,99
CD02-rev3	Aug 12, 2009	Dave Booz	Applied 73,76,78,80,82,83,88,102
CD03-rev4	Sept 3, 2009	Dave Booz	Editorial cleanup to match OASIS templates
CD02-rev5	Nov 9, 2009	Dave Booz	Fixed latest URLs Applied: 79, 87, 90, 97, 100, 101, 103, 106, 107, 108
CD02-rev6	Nov 17, 2009	Dave Booz	Applied 94, 109
CD02-rev7	Jan 1, 2010	Dave Booz	Updated namespace to latest assembly Applied issues: 79,110,111,112,113,114,115
CD02-rev8	Mar 17, 2010	Dave Booz	Applied issue 93 Editorial updates to prepare for next CD
CD02-rev9	April 8, 2010	Ashok Malhotra, Dave Booz	More Editorial cleanup
CD03	May 5, 2010	Dave Booz	Applied 117, Front Matter and TOC updates
CD03-rev1	July 14, 2010	Dave Booz	Applied 122
CD04	Sept 22, 2010	Dave Booz	Prepare CD04, front matter, participants

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