



2 **Web Services Reliable Messaging**
3 **Policy Assertion**
4 **(WS-RM Policy)**

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6 **~~Working Draft 01, July 6th 2005~~**

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55 **Abstract:**

56 This specification describes a domain-specific policy assertion for WS-ReliableMessaging
57 [WS-RM] that that can be specified within a policy alternative as defined in WS-Policy
58 Framework [WS-Policy].

59 **Composable Architecture:-**

60 -

61 By using the XML [XML], SOAP [SOAP], and WSDL [WSDL 1.1] extensibility models, the
62 WS* specifications are designed to be composed with each other to provide a rich Web
63 services environment. This by itself does not provide a negotiation solution for Web
64 services. This is a building block that is used in conjunction with other Web service and
65 application-specific protocols to accommodate a wide variety of policy exchange models.

66 **Status:**

67 ~~This document is a Committee Draft.~~

68 ~~This document was last revised or approved by the OASIS WS-RX Technical Committee~~
69 ~~on the above date. The level of approval is also listed above. Check the current location~~
70 ~~noted above for possible later revisions of this document.~~

71 ~~For information on whether any patents have been disclosed that may be essential to~~
72 ~~implementing this specification and any offers of patent licensing terms please refer to the~~
73 ~~Intellectual Property Rights section of the Technical Committee web page~~
74 ~~(<http://www.oasis-open.org/committees/ws-rx/ipr.php>).~~

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101 **1 Introduction**

102 This specification defines a domain-specific policy assertion for reliable messaging for use with
103 WS-Policy [[WS-Policy](#)] and WS-Reliable Messaging [[WS-RM](#)].

104 **1.1 Goals and Requirements**

105 **1.1.1 Requirements**

106 **1.2 Notational Conventions**

107 The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD",
108 "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be
109 interpreted as described in RFC 2119 [[KEYWORDS](#)].

110 This specification uses the following syntax to define normative outlines for messages:

- 111 • The syntax appears as an XML instance, but values in italics indicate data types instead
112 of values.
- 113 • Characters are appended to elements and attributes to indicate cardinality:
 - 114 ○ "?" (0 or 1)
 - 115 ○ "*" (0 or more)
 - 116 ○ "+" (1 or more)
- 117 • The character "|" is used to indicate a choice between alternatives.
- 118 • The characters "[" and "]" are used to indicate that contained items are to be treated as a
119 group with respect to cardinality or choice.
- 120 • An ellipsis (i.e. "...") indicates a point of extensibility that allows other child, or attribute,
121 content. Additional children and/or attributes MAY be added at the indicated extension
122 points but MUST NOT contradict the semantics of the parent and/or owner, respectively.
123 If an extension is not recognized it SHOULD be ignored.
- 124 • XML namespace prefixes (See Section [Namespace](#)) are used to indicate the namespace
125 of the element being defined.

126

127 **1.3 Namespace**

128 The XML namespace [[XML-ns](#)] URI that MUST be used by implementations of this specification
129 is:

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130
131

<http://docs.oasis-open.org/wsrmp/200510/schemas.xmlsoap.org/ws/2005/02/rm/policy>

132 Table 1 lists XML namespaces that are used in this specification. The choice of any namespace
133 prefix is arbitrary and not semantically significant.

134 -

135 The following namespaces are used in this document:

136 *Table Number range Table*

Prefix	Namespace	Specification
<u>wsp</u>	<u>http://schemas.xmlsoap.org/ws/2004/09/policy</u>	<u>[WS-Policy]</u>
<u>wsrmp</u>	<u>http://docs.oasis-open.org/wsrmp/200510/</u>	<u>This specification</u>
Prefix	Namespace	Specification
wsp	http://schemas.xmlsoap.org/ws/2004/09/policy	[WS-Policy]
wrm	http://schemas.xmlsoap.org/ws/2005/02/rm/policy	This specification

137 -

138 1.4 Compliance

139 ~~An implementation is not compliant with this specification if it fails to satisfy one or more of the~~
140 ~~MUST or REQUIRED level requirements defined herein. A SOAP Node MUST NOT use the XML~~
141 ~~namespace identifier for this specification (listed in SectionNamespace) within SOAP Envelopes~~
142 ~~unless it is compliant with this specification.~~

143 ~~An implementation is not compliant with this specification if it fails to satisfy one or more of the~~
144 ~~MUST or REQUIRED level requirements defined herein. A SOAP Node MUST NOT use the XML~~
145 ~~namespace identifier for this specification (listed in SectionNamespace) within SOAP Envelopes~~
146 ~~unless it is compliant with this specification.~~

147 Normative text within this specification takes precedence over normative outlines, which in turn
148 take precedence over the XML Schema [XML Schema Part 1, Part 2] descriptions.

149 -

150 2 RM Policy Assertions

151 WS-Policy Framework [WS-Policy] and WS-Policy Attachment [WS-PolicyAttachment] collectively
152 define a framework, model and grammar for expressing the requirements, and general
153 characteristics of entities in an XML Web services-based system. To enable an RM Destination
154 and an RM Source to describe their requirements for a given Sequence, this specification defines
155 a single RM policy assertion that leverages the WS-Policy framework.

156 2.1 Assertion Model

157 The RM policy assertion indicates that the RM Source and RM Destination MUST use WS-
158 ReliableMessaging [WS-RM] to ensure reliable message delivery. Specifically, the WS-
159 ReliableMessaging protocol determines invariants maintained by the reliable messaging
160 endpoints and the directives used to track and manage the delivery of a Sequence of messages.

161 -

162 The assertion defines an inactivity timeout parameter that either the RM Source or RM
163 Destination MAY include. If during this duration, an endpoint has received no application or control
164 messages, the endpoint MAY consider the RM Sequence to have been terminated due to
165 inactivity.

166 -

167 This assertion also defines a base retransmission interval parameter that the RM Source MAY
168 include. If no acknowledgement has been received for a given message within the interval, the
169 RM Source will retransmit the message. The retransmission interval MAY be modified at the
170 Source's discretion during the lifetime of the Sequence. This parameter does not alter the
171 formulation of messages as transmitted, only the timing of their transmission.

172 -

173 Similarly, this assertion defines a backoff parameter that the RM Source MAY include to indicate
174 the retransmission interval will be adjusted using the commonly known exponential backoff
175 algorithm [Tanenbaum].

176 The assertion defines a maximum message number parameter that the RM Destination MAY
177 include to indicate the maximum message number the RM Destination will accept. This is useful
178 for RM Destinations that may be running in constrained environments that can not accept values
179 as large as the default value of a maximum unsigned long.

180 -

181 Finally, this assertion defines an acknowledgement interval parameter that the RM Destination
182 MAY include. Per WS-ReliableMessaging [WS-RM], acknowledgements are sent on return
183 messages or sent stand-alone. If a return message is not available to send an acknowledgement,
184 an RM Destination MAY wait for up to the acknowledgement interval before sending a stand-alone
185 acknowledgement. If there are no unacknowledged messages, the RM Destination MAY choose
186 not to send an acknowledgement. This parameter does not alter the formulation of messages or
187 acknowledgements as transmitted; it does not alter the meaning of the wsrn:AckRequested

188 directive. Its purpose is to communicate the timing of acknowledgements so that the RM Source
189 may tune appropriately.

190 -

191 2.2 Normative Outline

192 The normative outline for the RM version assertion is:

```
193 <wsrmp:RMAssertion [wsp:Optional="true"]? ... >  
194   <wsrmp:InactivityTimeout Milliseconds="xs:unsignedLong" ... /> ?  
195   <wsrmp:BaseRetransmission IntervalMilliseconds="xs:unsignedLong" .../> ?  
196   <wsrmp:ExponentialBackoff ... /> ?  
197   <wsrmp:AcknowledgementInterval Milliseconds="xs:unsignedLong" ... /> ?  
198   <wsrmp:MaxMessageNumber Number="xs:unsignedLong" ... /> ?
```

199 -

```
200 <del>wsrmp:RMAssertion [wsp:Optional="true"]? ... >  
201 <del>  <wsrmp:InactivityTimeout Milliseconds="xs:unsignedLong" ... /> ?  
202 <del>  <wsrmp:BaseRetransmission IntervalMilliseconds="xs:unsignedLong" .../> ?  
203 <del>  <wsrmp:ExponentialBackoff ... /> ?  
204 <del>  <wsrmp:AcknowledgementInterval Milliseconds="xs:unsignedLong" ... /> ?  
205 <del>  ...  
206 </del>wsrmp:RMAssertion</del>
```

207 -

208 The following describes additional, normative constraints on the outline listed above:

209 /wsrmp:RMAssertion

210 A policy assertion that specifies that WS-ReliableMessaging [WS-RM] protocol MUST be
211 used for a Sequence.

212 /wsrmp:RMAssertion/@wsp:Optional="true"

213 Per WS-Policy [WS-Policy], this is compact notation for two policy alternatives, one with
214 and one without the assertion. The intuition is that the behavior indicated by the assertion
215 is optional, or in this case, that WS-ReliableMessaging MAY be used.

216 /wsrmp:RMAssertion/wsrmp:InactivityTimeout

217 A parameter that specifies a period of inactivity for a Sequence. If omitted, there is no
218 implied value.

219 /wsrmp:RMAssertion/wsrmp:InactivityTimeout/@Milliseconds

220 The inactivity timeout duration, specified in milliseconds.

221 /wsrmp:RMAssertion/wsrmp:BaseRetransmissionInterval

222 A parameter that specifies how long the RM Source will wait after transmitting a message
223 and before retransmitting the message. If omitted, there is no implied value.

224 /wsrmp:RMAssertion/wsrmp:BaseRetransmissionInterval/@Milliseconds

225 The base retransmission interval, specified in milliseconds.

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226 /wsmrp:RMAssertion/wsrp:ExponentialBackoff
 227 A parameter that specifies that the retransmission interval will be adjusted using the
 228 exponential backoff algorithm [Tanenbaum]. If omitted, there is no implied value.

229 /wsmrp:RMAssertion/wsrp:AcknowledgementInterval
 230 A parameter that specifies the duration after which the RM Destination will transmit an
 231 acknowledgement. If omitted, there is no implied value.

232 /wsmrp:RMAssertion/wsrp:AcknowledgementInterval/@Milliseconds
 233 The acknowledgement interval, specified in milliseconds.

234 [/wsmrp:RMAssertion/wsrp:MaxMessageNumber](#)
 235 [A parameter that specifies the maximum message number that the RM Destination will](#)
 236 [accept. If omitted, the default value of the maximum unsigned long will be assumed.](#)

237 [/wsmrp:RMAssertion/wsrp:MaxMessageNumber/@Number](#)
 238 [The maximum message number.](#)
 239 -

240 2.3 Assertion Attachment

241 Because the RM policy assertion indicates endpoint behavior over an RM Sequence, the
 242 assertion has Endpoint Policy Subject [WS-PolicyAttachment].

243 -

244 WS-PolicyAttachment defines three WSDL [WSDL 1.1] policy attachment points with Endpoint
 245 Policy Subject:

- 246 • wsdl:portType – A policy expression containing the RM policy assertion MUST NOT be
 247 attached to a wsdl:portType; the RM policy assertion specifies a concrete behavior whereas the
 248 wsdl:portType is an abstract construct.
- 249 • wsdl:binding – A policy expression containing the RM policy assertion SHOULD be attached
 250 to a wsdl:binding.
- 251 • wsdl:port – A policy expression containing the RM policy assertion MAY be attached to a
 252 wsdl:port.

253 -

254 If the RM policy assertion appears in a policy expression attached to both a wsdl:port and its
 255 corresponding wsdl:binding, the parameters in the former MUST be used and the latter ignored.

256 -

257 ~~Per WS-ReliableMessaging [WS-RM], a wsrp:CreateSequence request MAY contain an offer to~~
 258 ~~create an “inbound” Sequence. If the RM policy assertion is attached to an endpoint declaring only~~
 259 ~~input messages, the endpoint MUST reject a wsrp:CreateSequence request containing a~~
 260 ~~wsrp:Offer to create a corresponding Sequence. If the assertion is attached to an endpoint~~
 261 ~~declaring both input and output messages, the endpoint MUST reject a wsrp:CreateSequence~~
 262 ~~request that does not contain a wsrp:Offer to create a corresponding Sequence.~~

263 -

264 2.4 Assertion Example

265 Table 2 lists an example use of the RM policy assertion.

266 Table 2: Example policy with RM policy assertion

```
267 (01) <wsdl:definitions
268 (02)     targetNamespace="example.com"
269 (03)     xmlns:tns="example.com"
270 (04)     xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
271 (05)     xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy"
272 (06)     xmlns:wsrmp="http://docs.oasis-
273 open.org/wsrmp/200510/="http://schemas.xmlsoap.org/ws/2005/02/rm/policy
274 "
275 (07)     xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-
276 wss-wssecurity-utility-1.0.xsd" >
277 (08)
278 (09) <wsp:UsingPolicy wsdl:required="true" />
279 (10)
280 (11) <wsp:Policy wsu:Id="MyPolicy" >
281 (12)   <wsrmp:RMAssertion>
282 (13)     <wsrmp:InactivityTimeout Milliseconds="600000" />
283 (14)     <wsrmp:BaseRetransmissionInterval Milliseconds="3000" />
284 (15)     <wsrmp:ExponentialBackoff />
285 (16)     <wsrmp:AcknowledgementInterval Milliseconds="200" />
286 (17)   </wsrmp:RMAssertion>
287 (18)   <!-- omitted assertions -->
288 (19) </wsp:Policy>
289 (20)
290 (21) <!-- omitted elements -->
291 (22)
292 (23) <wsdl:binding name="MyBinding" type="tns:MyPortType" >
293 (24)   <wsp:PolicyReference URI="#MyPolicy" />
294 (25)   <!-- omitted elements -->
295 (26) </wsdl:binding>
296 (27)
297 (28) </wsdl:definitions>
298 (29)
```

299 Line (09) in Table 2 indicates that WS-Policy [WS-Policy] is in use as a required extension.

300 Lines (11-19) are a policy expression that includes a RM policy assertion (Lines 12-17) to indicate
301 that WS-ReliableMessaging [WS-RM] must used. Line (13) indicates the endpoint will consider
302 the Sequence terminated if there is no activity after ten minutes. Line (14) indicates the RM
303 Source will retransmit unacknowledged messages after three seconds, and Line (15) indicates
304 that exponential backoff algorithm will be used for timing of successive retransmissions should the

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305 message continue to go unacknowledged. Line (16) indicates the RM Destination may buffer
306 acknowledgements for up to two-tenths of a second.
307 Lines (23-26) are a WSDL [WSDL 1.1] binding. Line (24) indicates that the policy in Lines (11-19)
308 applies to this binding, specifically indicating that WS-ReliableMessaging must be used over all
309 the messages in the binding.

310 **2.5 Delivery Assurance**

311 The Delivery Assurance indicates a delivery assurance claim observed between an Application
312 Source and an RM Source or an Application Destination and an RM Destination. The
313 wsrmp:DeliveryAssurance described below specifies the Delivery Assurance as defined by WS-
314 ReliableMessaging [WS-RM].

315 *Note: This section is subject to change since the technical committee has not yet determined whether the*
316 *DeliveryAssurance should be represented as a separate policy assertion or be expressed within a context*
317 *of a wsrmp:RMAssertion.*

318 The normative outline of a Delivery Assurance is

```
319 <wsrmp:DeliveryAssertion mode="[AtLeastOnce|AtMostOnce|ExactlyOnce]"  
320 ordered="[xs:boolean]"? ..=" >
```

321 The following describes additional, normative constraints on the outline listed above:

322 /wsrmp:DeliveryAssertion

323 An assertion that makes a claim as to the delivery assurance policy observed by the
324 destination endpoint.

325 /wsrmp:DeliveryAssertion/@mode

326 This required attribute specifies whether or not all of the messages within an RM
327 Sequence will be delivered by the RM Destination to the Application Destination, and
328 whether or not duplicate messages will be delivered.

329 A value of 'AtMostOnce' means that messages received by the RM Destination will be
330 delivered to the Application Destination at most once, without duplication. It is possible
331 that some messages in a sequence may not be delivered.

332 A value of 'AtLeastOnce' means that every message received by the RM Destination will
333 be delivered to the Application Destination. Some messages may be delivered more than
334 once.

335 A value of 'ExactlyOnce' means that every message received by the RM Destination will
336 be delivered to the Application Destination without duplication.

337 /wsrmp:DeliveryAssertion/@ordered

338 This attribute, of type *xs:boolean*, specifies whether, or not, the destination endpoint
339 ensures that the messages within an RM Sequence will be delivered in order, by the RM
340 Destination to the Application Destination. Order is determined by the value of the RM
341 message number. Ordered delivery would mean that the messages would be delivered in
342 ascending order of the message number value. A value of 'true' indicates that messages
343 will be delivered in order. A value of 'false' makes no claims as to the order of delivery of
344 the messages within a RM Sequence. If omitted, the default implied value is 'false'.

345 **3 Security Considerations**

346 It is strongly RECOMMENDED that policies and assertions be signed to prevent tampering.

347 It is RECOMMENDED that policies SHOULD NOT be accepted unless they are signed and have an
348 associated security token to specify the signer has proper claims for the given policy. That is, a
349 relying party shouldn't rely on a policy unless the policy is signed and presented with sufficient
350 claims to pass the relying parties acceptance criteria.

351 -

352 It should be noted that the mechanisms described in this document could be secured as part of a
353 SOAP message using WS-Security [[WSS](#)] or embedded within other objects using object-specific
354 security mechanisms.

355 -

356 -

357 4 References

358 4.1 Normative

359 4.2 Non-Normative

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- 394 **[XML-Schema2]** W3C Recommendation, "XML Schema Part 2: Datatypes," 2 May 2001.
- 395 -
- 396 ~~**[XML-Schema2]** W3C Recommendation, "XML Schema Part 2: Datatypes," 2 May 2001.~~
- 397 -
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421 TBD

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423 Appendix B. XML Schema

424 A normative copy of the XML Schema [XML Schema Part 1, Part 2] description for this
425 specification may be retrieved from the following address:

426 <http://docs.oasis-open.org/wsrmp/200510schemas.xmlsoap.org/ws/2005/02/rm/wsrmp-policy.xsd>

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```
429 <?xml version="1.0" encoding="UTF-8"?>
430 <!--
431
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433 intellectual property or other rights that might be claimed to pertain
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```
-->
<xs:schema
  targetNamespace="http://docs.oasis-
open.org/wsrmp/200510/schemas.xmlsoap.org/ws/2005/02/rm/policy"
  xmlns:tns="http://docs.oasis-
open.org/wsrmp/200510/schemas.xmlsoap.org/ws/2005/02/rm/policy"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified" >

  <xs:element name="RMAssertion" >
    <xs:complexType>
      <xs:sequence>
        <xs:element name="InactivityTimeout" minOccurs="0" >
          <xs:complexType>
            <xs:attribute name="Milliseconds"
              type="xs:unsignedLong"
              use="required" />
            <xs:anyAttribute namespace="##any" processContents="lax" />
          </xs:complexType>
        </xs:element>
        <xs:element name="BaseRetransmissionInterval" minOccurs="0">
          <xs:complexType>
            <xs:attribute name="Milliseconds"
              type="xs:unsignedLong"
              use="required" />
            <xs:anyAttribute namespace="##any" processContents="lax" />
          </xs:complexType>
        </xs:element>
        <xs:element name="ExponentialBackoff" minOccurs="0" >
          <xs:complexType>
            <xs:anyAttribute namespace="##any" processContents="lax" />
          </xs:complexType>
        </xs:element>
        <xs:element name="AcknowledgementInterval" minOccurs="0" >
          <xs:complexType>
            <xs:attribute name="Milliseconds"
              type="xs:unsignedLong"
```

File name

Date

```
512         use="required" />
513         <xs:anyAttribute namespace="##any" processContents="lax" />
514     </xs:complexType>
515 </xs:element>
516 <xs:element name="MaxMessageNumber" minOccurs="0" >
517 <xs:complexType>
518 <xs:attribute name="Number"
519 type="xs:unsignedLong"
520 use="required" />
521 <xs:anyAttribute namespace="##any" processContents="lax" />
522 </xs:complexType>
523 </xs:element>
524     <xs:any namespace="##other"
525         processContents="lax"
526         minOccurs="0"
527         maxOccurs="unbounded" />
528 </xs:sequence>
529     <xs:anyAttribute namespace="##any" processContents="lax" />
530 </xs:complexType>
531 </xs:element>
532
533 </xs:schema>
534 -
535 -
```

536 **Appendix C. Revision History**

<i>Revision</i>	<i>Date</i>	<i>By Whom</i>	<i>What</i>
wd-01.doc	2005-07-06	Ümit Yalçinalp	Initial version created based on submission by the authors.
1.0-wd-01.swx	2005-09-01	Ümit Yalçinalp	Reformatted using Open Office
1.1-wd-01.swx	2005-09-18	Ümit Yalçinalp	Applied resolution i001 Applied resolution i015/16 (doc identifier) Partial application of i017, final yyyy/mm required, changed doc URI to TBD pending yyyy/mm Deleted original copyright section
1.1-wd-01.swx	2005-10-02	Anish Karmarkar	Applied resolution of i013 + minor editorial changes + fixed resolution of i017
1.1-wd-01.swx	2005-10-04	Ümit Yalçinalp	Applied actual value for yyyy/mm. Added resolution of i009
1.1-wd-01.swx	2005-10-06	Ümit Yalçinalp	Editorial fixes suggested by Anish Updated wd draft date to October 6th
1.1-wd-01.swx	2005-10-19	Ümit Yalçinalp	Editorial change to remove .swx suffix from doc id

<i>Revision</i>	<i>Date</i>	<i>By Whom</i>	<i>What</i>
wd-01.doc	2005-07-06	Ümit Yalçinalp	Initial version created based on submission by the authors.
ws-01.swx	2005-09-01	Ümit Yalçinalp	Reformatted using Open Office

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