



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

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17 **Abstract:**

18 This specification describes a domain-specific policy assertion for WS-ReliableMessaging
19 [[WS-RM](#)] that that can be specified within a policy alternative as defined in WS-Policy
20 Framework [[WS-Policy](#)].

21 **Composable Architecture:**

22

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

28 **Status:**

29 TBD

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56 1 Introduction

57 This specification defines a domain-specific policy assertion for reliable messaging for use with
58 WS-Policy [WS-Policy] and WS-Reliable Messaging [WS-RM].

59 1.1 Goals and Requirements

60 1.1.1 Requirements

61 1.2 Notational Conventions

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

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

- 66 • The syntax appears as an XML instance, but values in italics indicate data types instead
67 of values.
- 68 • Characters are appended to elements and attributes to indicate cardinality:
 - 69 ○ "?" (0 or 1)
 - 70 ○ "*" (0 or more)
 - 71 ○ "+" (1 or more)
- 72 • The character "|" is used to indicate a choice between alternatives.
- 73 • The characters "[" and "]" are used to indicate that contained items are to be treated as a
74 group with respect to cardinality or choice.
- 75 • An ellipsis (i.e. "...") indicates a point of extensibility that allows other child, or attribute,
76 content. Additional children and/or attributes MAY be added at the indicated extension
77 points but MUST NOT contradict the semantics of the parent and/or owner, respectively.
78 If an extension is not recognized it SHOULD be ignored.
- 79 • XML namespace prefixes (See Section [Namespace](#)) are used to indicate the namespace
80 of the element being defined.

81

82 1.3 Namespace

83 The XML namespace [XML-ns] URI that MUST be used by implementations of this specification
84 is:

85 <http://docs.oasis-open.org/wsrmp/200510/>

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

88 The following namespaces are used in this document:

89 *Table 1*

Prefix	Namespace	Specification
wsp	http://schemas.xmlsoap.org/ws/2004/09/policy	[WS-Policy]
wsrmp	http://docs.oasis-open.org/wsrmp/200510/	This specification

90 1.4 Compliance

91 An implementation is not compliant with this specification if it fails to satisfy one or more of the
92 MUST or REQUIRED level requirements defined herein. A SOAP Node MUST NOT use the XML
93 namespace identifier for this specification (listed in Section [Namespace](#)) within SOAP Envelopes
94 unless it is compliant with this specification.

95 Normative text within this specification takes precedence over normative outlines, which in turn
96 take precedence over the XML Schema [[XML Schema Part 1](#), [Part 2](#)] descriptions.

97 2 RM Policy Assertions

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

103 2.1 Assertion Model

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

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

~~112 This assertion also defines a base retransmission interval parameter that the RM Source MAY~~
~~113 include. If no acknowledgement has been received for a given message within the interval, the~~
~~114 RM Source will retransmit the message. The retransmission interval MAY be modified at the~~
~~115 Source's discretion during the lifetime of the Sequence. This parameter does not alter the~~
~~116 formulation of messages as transmitted, only the timing of their transmission.~~

~~117 Similarly, this assertion defines a backoff parameter that the RM Source MAY include to indicate~~
~~118 the retransmission interval will be adjusted using the commonly known exponential backoff~~
~~119 algorithm [Tanenbaum].~~

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

~~124 Finally, this assertion defines an acknowledgement interval parameter that the RM Destination~~
~~125 MAY include. Per WS-ReliableMessaging [WS-RM], acknowledgements are sent on return~~
~~126 messages or sent stand alone. If a return message is not available to send an acknowledgement,~~
~~127 an RM Destination MAY wait for up to the acknowledgement interval before sending a stand alone~~
~~128 acknowledgement. If there are no unacknowledged messages, the RM Destination MAY choose~~
~~129 not to send an acknowledgement. This parameter does not alter the formulation of messages or~~
~~130 acknowledgements as transmitted, it does not alter the meaning of the wsrm:AckRequested~~
~~131 directive. Its purpose is to communicate the timing of acknowledgements so that the RM Source~~
~~132 may tune appropriately.~~

133 2.2 Normative Outline

134 The normative outline for the RM version assertion is:

```

135 <wsrmp:RMAssertion [wsp:Optional="true"]? ... >
136   <wsrmp:InactivityTimeout Milliseconds="xs:unsignedLong" ... /> ?
137   <wsrmp:BaseRetransmissionInterval Milliseconds="xs:unsignedLong" ... /> ?
138   <wsrmp:ExponentialBackoff ... /> ?
139   <wsrmp:AcknowledgementInterval Milliseconds="xs:unsignedLong" ... /> ?
140   <wsrmp:MaxMessageNumber Number="xs:unsignedLong" ... /> ?
141   ...
142 </wsrmp:RMAssertion>

```

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

144 /wsrmp:RMAssertion

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

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

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

151 /wsrmp:RMAssertion/wsrmp:InactivityTimeout

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

154 /wsrmp:RMAssertion/wsrmp:InactivityTimeout/@Milliseconds

155 The inactivity timeout duration, specified in milliseconds.

156 ~~/wsrmp:RMAssertion/wsrmp:BaseRetransmissionInterval~~

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

159 ~~/wsrmp:RMAssertion/wsrmp:BaseRetransmissionInterval/@Milliseconds~~

160 ~~The base retransmission interval, specified in milliseconds.~~

161 ~~/wsrmp:RMAssertion/wsrmp:ExponentialBackoff~~

162 ~~A parameter that specifies that the retransmission interval will be adjusted using the~~
 163 ~~exponential backoff algorithm [Tanenbaum]. If omitted, there is no implied value.~~

164 ~~/wsrmp:RMAssertion/wsrmp:AcknowledgementInterval~~

165 ~~A parameter that specifies the duration after which the RM Destination will transmit an~~
 166 ~~acknowledgement. If omitted, there is no implied value.~~

167 ~~/wsrmp:RMAssertion/wsrmp:AcknowledgementInterval/@Milliseconds~~

168 ~~The acknowledgement interval, specified in milliseconds.~~

169 /wsrmp:RMAssertion/wsrmp:MaxMessageNumber

170 A parameter that specifies the maximum message number that the RM Destination will
 171 accept. If omitted, the default value of the maximum unsigned long will be assumed.

172 /wsrmp:RMAssertion/wsrmp:MaxMessageNumber/@Number

173 The maximum message number.

174 2.3 Assertion Attachment

175 Because the RM policy assertion indicates endpoint behavior over an RM Sequence, the
176 assertion has Endpoint Policy Subject [[WS-PolicyAttachment](#)].

177 WS-PolicyAttachment defines three WSDL [[WSDL 1.1](#)] policy attachment points with Endpoint
178 Policy Subject:

- 179 • wsdl:portType – A policy expression containing the RM policy assertion MUST NOT be
180 attached to a wsdl:portType; the RM policy assertion specifies a concrete behavior whereas the
181 wsdl:portType is an abstract construct.
- 182 • wsdl:binding – A policy expression containing the RM policy assertion SHOULD be attached
183 to a wsdl:binding.
- 184 • wsdl:port – A policy expression containing the RM policy assertion MAY be attached to a
185 wsdl:port.

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

188 2.4 Assertion Example

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

190 Table 2: Example policy with RM policy assertion

```
191 (01) <wsdl:definitions
192 (02)   targetNamespace="example.com"
193 (03)   xmlns:tns="example.com"
194 (04)   xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
195 (05)   xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy"
196 (06)   xmlns:wsrmp="http://docs.oasis-open.org/wsrmp/200510/"
197 (07)   xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-
198 wss-wssecurity-utility-1.0.xsd" >
199 (08)
200 (09) <wsp:UsingPolicy wsdl:required="true" />
201 (10)
202 (11) <wsp:Policy wsu:Id="MyPolicy" >
203 (12)   <wsrmp:RMAssertion>
204 (13)     <wsrmp:InactivityTimeout Milliseconds="600000" />
205 (14)     <wsrmp:BaseRetransmissionInterval Milliseconds="3000" />
206 (15)     <wsrmp:ExponentialBackoff />
207 (16)     <wsrmp:AcknowledgementInterval Milliseconds="200" />
208 (17)   </wsrmp:RMAssertion>
209 (18)   <!-- omitted assertions -->
210 (19) </wsp:Policy>
211 (20)
212 (21) <!-- omitted elements -->
213 (22)
214 (23) <wsdl:binding name="MyBinding" type="tns:MyPortType" >
```



```

215 (24) <wsp:PolicyReference URI="#MyPolicy" />
216 (25) <!-- omitted elements -->
217 (26) </wsdl:binding>
218 (27)
219 (28)</wsdl:definitions>
220 (29)

```

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

222 Lines (11-19) are a policy expression that includes a RM policy assertion (Lines 12-17) to indicate
 223 that WS-ReliableMessaging [WS-RM] must be used. Line (13) indicates the endpoint will consider
 224 the Sequence terminated if there is no activity after ten minutes. ~~Line (14) indicates the RM~~
 225 ~~Source will retransmit unacknowledged messages after three seconds, and Line (15) indicates~~
 226 ~~that exponential backoff algorithm will be used for timing of successive retransmissions should the~~
 227 ~~message continue to go unacknowledged. Line (16) indicates the RM Destination may buffer~~
 228 ~~acknowledgements for up to two tenths of a second.~~

229 Lines (23-26) are a WSDL [WSDL 1.1] binding. Line (24) indicates that the policy in Lines (11-19)
 230 applies to this binding, specifically indicating that WS-ReliableMessaging must be used over all
 231 the messages in the binding.

232 2.5 Delivery Assurance

233 The Delivery Assurance indicates a delivery assurance claim observed between an Application
 234 Source and an RM Source or an Application Destination and an RM Destination. The
 235 wsrmp:DeliveryAssurance described below specifies the Delivery Assurance as defined by WS-
 236 ReliableMessaging [WS-RM],

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

240 The normative outline of a Delivery Assurance is

```

241 <wsrmp:DeliveryAssertion mode="[AtLeastOnce|AtMostOnce|ExactlyOnce]"
242 ordered="[xs:boolean]"? ...=" ">

```

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

244 /wsrmp:DeliveryAssertion

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

247 /wsrmp:DeliveryAssertion/@mode

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

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

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

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

259 /wsrmp:[DeliveryAssertion/@ordered](#)

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

267 **3 Security Considerations**

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

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

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

276 4 References

277 4.1 Normative

278 4.2 Non-Normative

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- 283 **[URI]** T. Berners-Lee, R. Fielding, L. Masinter, "Uniform Resource Identifiers (URI):
284 Generic Syntax," RFC 2396, MIT/LCS, U.C. Irvine, Xerox Corporation,
285 August 1998.
- 286 **[WS-RM]** R. Bilorusets, et al, "Web Services Reliable Messaging (WS-
287 ReliableMessaging)," February 2005.
- 288 **[WS-Policy]** D. Box, et al, "Web Services Policy Framework (WS-Policy)," September
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- 290 **[WS-PolicyAttachment]** D. Box, et al, "Web Services Policy Attachment (WS-PolicyAttachment),
291 " September 2004.
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293 2004)", Chris Kaler, Phillip Hallam-Baker, Ronald Monzillo, eds, OASIS
294 Standard 200401, March 2004.
- 295 **[WSDL 1.1]** W3C Note, "Web Services Description Language (WSDL 1.1)," 15 March
296 2001.
- 297 **[XML]** W3C Recommendation, "Extensible Markup Language (XML) Third Edition,"
298 4 February 2004.
- 299 **[XML-ns]** W3C Recommendation, "Namespaces in XML," 14 January 1999.
- 300 **[XML-Schema1]** W3C Recommendation, "XML Schema Part 1: Structures," 2 May 2001.
- 301 **[XML-Schema2]** W3C Recommendation, "XML Schema Part 2: Datatypes," 2 May 2001.

302 **Appendix A. Acknowledgments**

303 This document is based on initial contribution to OASIS WS-RX Technical Committee by the
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318 The following individuals were members of the committee during the development of this
319 specification:

320 TBD

321 Appendix B. XML Schema

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

324 <http://docs.oasis-open.org/wsrmp/200510/wsrmp-policy.xsd>

```
325 <?xml version="1.0" encoding="UTF-8"?>
326 <!--
327
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```
-->
<xs:schema
  targetNamespace="http://docs.oasis-open.org/wsrmp/200510/"
  xmlns:tns="http://docs.oasis-open.org/wsrmp/200510/"
  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"
  use="required" />
<xs:anyAttribute namespace="##any" processContents="lax" />
</xs:complexType>
</xs:element>
    <xs:element name="MaxMessageNumber" minOccurs="0" >
```

```

411     <xs:complexType>
412         <xs:attribute name="Number"
413             type="xs:unsignedLong"
414             use="required" />
415         <xs:anyAttribute namespace="##any" processContents="lax" />
416     </xs:complexType>
417 </xs:element>
418 <xs:any namespace="##other"
419     processContents="lax"
420     minOccurs="0"
421     maxOccurs="unbounded" />
422 </xs:sequence>
423 <xs:anyAttribute namespace="##any" processContents="lax" />
424 </xs:complexType>
425 </xs:element>
426
427 </xs:schema>

```


428 Appendix C. Revision History

Revision	Date	By Whom	What
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

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