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# 2 Web Services ReliableMessaging Policy 3 Assertion 4 (WS-RM Policy)

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16 **Abstract:**

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

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

25 **Status:**

26 This document is a work in progress and will be updated to reflect issues as they are resolved by  
27 the Web Services Reliable Exchange (WS-RX) Technical Committee.

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# 49 1 Introduction

50 This specification defines a domain-specific policy assertion for reliable messaging for use with WS-Policy  
51 [\[WS-Policy\]](#) and WS-ReliableMessaging [\[WS-RM\]](#).

## 52 1.1 Goals and Requirements

### 53 1.1.1 Requirements

### 54 1.2 Notational Conventions

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

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

- 59 • The syntax appears as an XML instance, but values in italics indicate data types instead of values.
- 60 • Characters are appended to elements and attributes to indicate cardinality:
  - 61 ○ "?" (0 or 1)
  - 62 ○ "\*" (0 or more)
  - 63 ○ "+" (1 or more)
- 64 • The character "|" is used to indicate a choice between alternatives.
- 65 • The characters "[" and "]" are used to indicate that contained items are to be treated as a group  
66 with respect to cardinality or choice.
- 67 • An ellipsis (i.e. "...") indicates a point of extensibility that allows other child, or attribute, content.  
68 Additional children and/or attributes MAY be added at the indicated extension points but MUST  
69 NOT contradict the semantics of the parent and/or owner, respectively. If an extension is not  
70 recognized it SHOULD be ignored.
- 71 • XML namespace prefixes (See Section [Namespace](#)) are used to indicate the namespace of the  
72 element being defined.

### 73 1.3 Namespace

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

75 `http://docs.oasis-open.org/ws-rx/wsrmp/200510`

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

78 The following namespaces are used in this document:

79 *Table 1*

Prefix	Namespace	Specification
wsp	http://schemas.xmlsoap.org/ws/2004/09/policy	<a href="#">[WS-Policy]</a>
wsrmp	http://docs.oasis-open.org/ws-rx/wsrmp/200510	This specification.

## 80 **1.4 Compliance**

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

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

## 87 2 RM Policy Assertions

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

### 93 2.1 Assertion Model

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

98 The assertion defines an inactivity timeout parameter that the RM Destination MAY include. If during this  
99 duration, an endpoint has received no application or control messages, the endpoint MAY consider the  
100 RM Sequence to have been terminated due to inactivity.

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

105 Finally, this assertion defines an acknowledgement interval parameter that the RM Destination MAY  
106 include. Per WS-ReliableMessaging [WS-RM], acknowledgements are sent on return messages or sent  
107 stand-alone. If a return message is not available to send an acknowledgement, an RM Destination MAY  
108 wait for up to the acknowledgement interval before sending a stand-alone acknowledgement. If there are  
109 no unacknowledged messages, the RM Destination MAY choose not to send an acknowledgement. This  
110 parameter does not alter the formulation of messages or acknowledgements as transmitted; it does not  
111 alter the meaning of the wsrmp:AckRequested directive. Its purpose is to communicate the timing of  
112 acknowledgements so that the RM Source may tune appropriately.

113 The RM assertion parameters do not affect the messages which are sent on the wire.

### 114 2.2 Normative Outline

115 The normative outline for the RM version assertion is:

```
116 <wsrmp:RMAssertion [wsp:Optional="true"]? ... >  
117   <wsrmp:InactivityTimeout Milliseconds="xs:unsignedLong" ... /> ?  
118   <wsrmp:AcknowledgementInterval Milliseconds="xs:unsignedLong" ... /> ?  
119   <wsrmp:MaxMessageNumber Number="xs:unsignedLong" ... /> ?  
120   ...  
121 </wsrmp:RMAssertion>
```

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

123 /wsrmp:RMAssertion

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

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

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

130 /wsrmp:RMAssertion/wsrmp:InactivityTimeout

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

133 /wsrmp:RMAssertion/wsrmp:InactivityTimeout/@Milliseconds

134 The inactivity timeout duration, specified in milliseconds.

135 /wsrmp:RMAssertion/wsrmp:AcknowledgementInterval

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

138 /wsrmp:RMAssertion/wsrmp:AcknowledgementInterval/@Milliseconds

139 The acknowledgement interval, specified in milliseconds.

140 /wsrmp:RMAssertion/wsrmp:MaxMessageNumber

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

143 /wsrmp:RMAssertion/wsrmp:MaxMessageNumber/@Number

144 The maximum message number.

## 145 **2.3 Assertion Attachment**

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

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

- 150 • wsdl:portType – A policy expression containing the RM policy assertion MUST NOT be attached to  
151 a wsdl:portType; the RM policy assertion specifies a concrete behavior whereas the wsdl:portType is an  
152 abstract construct.
- 153 • wsdl:binding – A policy expression containing the RM policy assertion SHOULD be attached to a  
154 wsdl:binding.
- 155 • wsdl:port – A policy expression containing the RM policy assertion MAY be attached to a wsdl:port.

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

## 158 **2.4 Assertion Example**

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

160 Table 2: Example policy with RM policy assertion

```
161 (01) <wsdl:definitions  
162 (02)   targetNamespace="example.com"  
163 (03)   xmlns:tns="example.com"  
164 (04)   xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
```

```

165 (05)   xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy"
166 (06)   xmlns:wsrmp="http://docs.oasis-open.org/ws-rx/wsrmp/200510"
167 (07)   xmlns:wssu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-
168 wss-wssecurity-utility-1.0.xsd">
169 (08)
170 (09)   <wsp:UsingPolicy wsdl:required="true" />
171 (10)
172 (11)   <wsp:Policy wsu:Id="MyPolicy" >
173 (12)     <wsrmp:RMAssertion>
174 (13)       <wsrmp:InactivityTimeout Milliseconds="600000" />
175 (14)       <wsrmp:AcknowledgementInterval Milliseconds="200" />
176 (15)     </wsrmp:RMAssertion>
177 (16)     <!-- omitted assertions -->
178 (17)   </wsp:Policy>
179 (18)
180 (19)   <!-- omitted elements -->
181 (20)
182 (21)   <wsdl:binding name="MyBinding" type="tns:MyPortType" >
183 (22)     <wsp:PolicyReference URI="#MyPolicy" />
184 (23)     <!-- omitted elements -->
185 (24)   </wsdl:binding>
186 (25)
187 (26) </wsdl:definitions>

```

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

189 Lines (11-19) are a policy expression that includes a RM policy assertion (Lines 12-15) to indicate that  
190 WS-ReliableMessaging [WS-RM] must be used. Line (13) indicates the endpoint will consider the Sequence  
191 terminated if there is no activity after ten minutes. Line (14) indicates the RM Destination may buffer  
192 acknowledgements for up to two-tenths of a second.

193 Lines (21-24) are a WSDL [WSDL 1.1] binding. Line (22) indicates that the policy in Lines (11-17) applies  
194 to this binding, specifically indicating that WS-ReliableMessaging must be used over all the messages in  
195 the binding.

## 196 2.5 Delivery Assurance

197 The Delivery Assurance indicates a delivery assurance claim in effect between an Application Source and  
198 an RM Source or an Application Destination and an RM Destination. The wsrmp:DeliveryAssurance  
199 described below specifies the Delivery Assurance as defined by WS-ReliableMessaging [WS-RM].

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

203 The normative outline of a Delivery Assurance is:

```

204 <wsrmp:DeliveryAssurance mode=" [AtLeastOnce|AtMostOnce|ExactlyOnce] "
205   ordered=" [xs:boolean] "? ..=" " >

```

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

207 /wsrmp:DeliveryAssurance

208 An assertion that makes a claim as to the delivery assurance policy in effect at the destination  
209 endpoint.

210 /wsrmp:DeliveryAssurance/@mode

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

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

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

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

221 /wsrmp:DeliveryAssertion/@ordered

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



## 229 **3 Security Considerations**

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

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

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

## 238 **4 References**

### 239 **4.1 Normative**

### 240 **4.2 Non-Normative**

#### 241 **[KEYWORDS]**

242 S. Bradner, "Key words for use in RFCs to Indicate Requirement Levels," RFC 2119, Harvard University,  
243 March 1997.

#### 244 **[SOAP]**

245 W3C Note, "SOAP: Simple Object Access Protocol 1.1," 08 May 2000.

#### 246 **[URI]**

247 T. Berners-Lee, R. Fielding, L. Masinter, "Uniform Resource Identifiers (URI): Generic Syntax," RFC 2396,  
248 MIT/LCS, U.C. Irvine, Xerox Corporation, August 1998.

#### 249 **[WS-RM]**

250 R. Bilorusets, et al, "Web Services Reliable Messaging (WS-ReliableMessaging)," February 2005.

#### 251 **[WS-Policy]**

252 D. Box, et al, "Web Services Policy Framework (WS-Policy)," September 2004.

#### 253 **[WS-PolicyAttachment]**

254 D. Box, et al, "Web Services Policy Attachment (WS-PolicyAttachment)," September 2004.

#### 255 **[WSS]**

256 OASIS Web Services Security: SOAP Message Security 1.0 (WS-Security 2004)", Chris Kaler, Phillip  
257 Hallam-Baker, Ronald Monzillo, eds, OASIS Standard 200401, March 2004.

#### 258 **[WSDL 1.1]**

259 W3C Note, "Web Services Description Language (WSDL 1.1)," 15 March 2001.

#### 260 **[XML]**

261 W3C Recommendation, "Extensible Markup Language (XML) Third Edition," 4 February 2004.

#### 262 **[XML-ns]**

263 W3C Recommendation, "Namespaces in XML," 14 January 1999.

#### 264 **[XML-Schema1]**

265 W3C Recommendation, "XML Schema Part 1: Structures," 2 May 2001.

#### 266 **[XML-Schema2]**

267 W3C Recommendation, "XML Schema Part 2: Datatypes," 2 May 2001.

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283 The following individuals were members of the committee during the development of this specification:

284 TBD

## 285 B. XML Schema

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

288 <http://docs.oasis-open.org/ws-rx/wsrmp/200510/wsrmp-1.1.xsd>

289 The following copy is provided for reference.

```
290 <?xml version="1.0" encoding="UTF-8"?>
291 <!--
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333 MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
334 -->
335 <xs:schema
336   targetNamespace="http://docs.oasis-open.org/ws-rx/wsrmp/200510"
337   xmlns:tns="http://docs.oasis-open.org/ws-rx/wsrmp/200510"
338   xmlns:xs="http://www.w3.org/2001/XMLSchema"
339   elementFormDefault="qualified"
```

```

340     attributeFormDefault="unqualified" >
341
342     <xs:element name="RMAssertion" >
343       <xs:complexType>
344         <xs:sequence>
345           <xs:element name="InactivityTimeout" minOccurs="0" >
346             <xs:complexType>
347               <xs:attribute name="Milliseconds"
348                 type="xs:unsignedLong"
349                 use="required" />
350               <xs:anyAttribute namespace="##any" processContents="lax" />
351             </xs:complexType>
352           </xs:element>
353           <xs:element name="AcknowledgementInterval" minOccurs="0" >
354             <xs:complexType>
355               <xs:attribute name="Milliseconds"
356                 type="xs:unsignedLong"
357                 use="required" />
358               <xs:anyAttribute namespace="##any" processContents="lax" />
359             </xs:complexType>
360           </xs:element>
361           <xs:element name="MaxMessageNumber" minOccurs="0" >
362             <xs:complexType>
363               <xs:attribute name="Number"
364                 type="xs:unsignedLong"
365                 use="required" />
366               <xs:anyAttribute namespace="##any" processContents="lax" />
367             </xs:complexType>
368           </xs:element>
369           <xs:any namespace="##other"
370             processContents="lax"
371             minOccurs="0"
372             maxOccurs="unbounded" />
373         </xs:sequence>
374         <xs:anyAttribute namespace="##any" processContents="lax" />
375       </xs:complexType>
376     </xs:element>
377 </xs:schema>

```

## 378 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
wd-02	2005-11-03	Gilbert Pilz	Start wd-02 by changing title page from cd-01.
wd-02	2005-11-30	Gilbert Pilz	i072 – editorial nits
wd-02	2005-11-30	Gilbert Pilz	i074 - Use of [tcShortName] in artifact locations namespaces, etc
wd-02	2005-12-01	Gilbert Pilz	Updated fix to i074 to remove trailing '/' from wsrmp namespace.
wd-02	2005-12-01	Anish Karmarkar	Applied resolution for i022
wd-02	2005-12-01	Anish Karmarkar	Applied resolution for i024
wd-02	2005-12-01	Anish Karmarkar	Applied resolution for i054
wd-02	2005-12-01	Anish Karmarkar	Applied resolution of i073

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