



1 ~~Web Services ReliableMessaging Policy Assertion (WS-RM Policy)~~

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38 [See the Acknowledgments \(Appendix A\):](#)

39 **Abstract:**
40 This specification describes a domain-specific policy assertion for WS-ReliableMessaging [WS-
41 RM] that that can be specified within a policy alternative as defined in WS-Policy Framework [WS-
42 Policy].
43 By using the XML [XML], SOAP [SOAP 1.1], [SOAP 1.2] and WSDL [WSDL 1.1] extensibility
44 models, the WS* specifications are designed to be composed with each other to provide a rich
45 Web services environment. This by itself does not provide a negotiation solution for Web services.
46 This is a building block that is used in conjunction with other Web service and application-specific
47 protocols to accommodate a wide variety of policy exchange models.

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134 1 Introduction

135 This specification defines a domain-specific policy assertion for reliable messaging for use with WS-Policy
136 and WS-ReliableMessaging.

137 1.1 Goals and Requirements

138 1.1.1 Requirements

139 1.1 Terminology

140 1.1 ~~Notational Conventions~~

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

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

- 145 • The syntax appears as an XML instance, but values in italics indicate data types instead of values.
- 146 • Characters are appended to elements and attributes to indicate cardinality:
 - 147 ○ "?" (0 or 1)
 - 148 ○ "*" (0 or more)
 - 149 ○ "+" (1 or more)
- 150 • The character "|" is used to indicate a choice between alternatives.
- 151 • The characters "[" and "]" are used to indicate that contained items are to be treated as a group
152 with respect to cardinality or choice.
- 153 • An ellipsis (i.e. "...") indicates a point of extensibility that allows other child, or attribute, content.
154 Additional children and/or attributes MAY be added at the indicated extension points but MUST
155 NOT contradict the semantics of the parent and/or owner, respectively. If an extension is not
156 recognized it SHOULD be ignored.
- 157 • XML namespace prefixes (See Section 1.3) are used to indicate the namespace of the element
158 being defined.

159 Elements and Attributes defined by this specification are referred to in the text of this document using
160 XPath 1.0 [XPATH 1.0] expressions. Extensibility points are referred to using an extended version of this
161 syntax:

- 162 • An element extensibility point is referred to using {any} in place of the element name. This
163 indicates that any element name can be used, from any namespace other than the wsrmp:
164 namespace.
- 165 • An attribute extensibility point is referred to using @{any} in place of the attribute name. This
166 indicates that any attribute name can be used, from any namespace other than the wsrmp:
167 namespace.

168 **1.2 Namespace**

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

170 <http://docs.oasis-open.org/ws-rx/wsrmp/200702608>

171 Dereferencing the above URI will produce the Resource Directory Description Language [RDDL 2.0]
172 document that describes this namespace.

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

175 Table 1

Prefix	Namespace	Specification
wSDL	http://schemas.xmlsoap.org/wSDL/	[WSDL 1.1]
wsp	http://schemas.xmlsoap.org/ws/2004/09/policy	[WS-Policy]
wsrmp	http://docs.oasis-open.org/ws-rx/wsrmp/200702	This specification.
wsu	http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-utility-1.0.xsd	WS-Security-Utility Schema

176 **1.3 Compliance**

177 An implementation is not compliant with this specification if it fails to satisfy one or more of the MUST or
178 REQUIRED level requirements defined herein. A SOAP Node MUST NOT use the XML namespace
179 identifier for this specification (listed in Section 1.3) within SOAP Envelopes unless it is compliant with this
180 specification.

181 Normative text within this specification takes precedence over normative outlines, which in turn take
182 precedence over the XML Schema [XML-Schema Part1, XML-Schema Part2] descriptions.

2 RM Policy Assertions

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

2.1 Assertion Model

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

2.2 Normative Outline

The normative outline for the RM assertion is:

```
<wsrmp:RMAssertion [wsp:Optional="true"]? ... >
  <wsp:Policy>
    [ <wsrmp:SequenceSTR/> |
      <wsrmp:SequenceTransportSecurity/> ] ?
    <wsrmp:DeliveryAssurance>
      <wsp:Policy>
        [ <wsrmp:ExactlyOnce/> |
          <wsrmp:AtLeastOnce/> |
          <wsrmp:AtMostOnce/> ]
        <wsrmp:InOrder/> ?
      </wsp:Policy>
    </wsrmp:DeliveryAssurance> ?
  </wsp:Policy>
  ...
</wsrmp:RMAssertion>
```

The following describes ~~the content model of the RMAssertion element, additional, normative constraints on the outline listed above:~~

/wsrmp:RMAssertion

A policy assertion that specifies that WS-ReliableMessaging protocol MUST be used when sending messages.

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

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

/wsrmp:RMAssertion/wsp:Policy

This required element allows for the inclusion of nested policy assertions.

/wsrmp:RMAssertion/wsp:Policy/wsrmp:SequenceSTR

223 When present, this assertion defines the requirement that an RM Sequence MUST be bound to
224 an explicit token that is referenced from a `wsse:SecurityTokenReference` in the
225 `CreateSequence` message. See section 2.5.1.

226 `/wsrmp:RMAssertion/wsp:Policy/wsrmp:SequenceTransportSecurity`

227 When present, this assertion defines the requirement that an RM Sequence MUST be bound to
228 the session(s) of the underlying transport-level protocol used to carry the `CreateSequence` and
229 `CreateSequenceResponse` message. When present, this assertion MUST be used in
230 conjunction with the `sp:TransportBinding` assertion, see section 2.5.2.

231 `/wsrmp:RMAssertion/wsp:Policy/wsrmp:DeliveryAssurance`

232 This expression, which may be omitted, describes the message delivery quality of service
233 between the RM and application layer. When used by an RM Destination it expresses the delivery
234 assurance in effect between the RM Destination and its corresponding application destination,
235 and it also indicates requirements on any RM Source that transmits messages to this RM
236 destination. Conversely when used by an RM Source it expresses the delivery assurance in effect
237 between the RM Source and its corresponding application source, as well as indicating
238 requirements on any RM Destination that receives messages from this RM Source. In either case
239 the delivery assurance does not affect the messages transmitted on the wire. Absence of this
240 expression from a `wsrmp:RMAssertion` policy assertion simply means that the endpoint has
241 chosen not to advertise its delivery assurance characteristics.
242 Note that when there are multiple policy alternatives of the RM Assertion, the Delivery Assurance
243 on each MUST NOT conflict.

244 `/wsrmp:RMAssertion/wsp:Policy/wsrmp:DeliveryAssurance/wsp:Policy`

245 This required element identifies additional requirements for the use of the
246 `wsrmp:DeliveryAssurance`.

247 `/wsrmp:RMAssertion/wsp:Policy/wsrmp:DeliveryAssurance/wsp:Policy/wsrmp:ExactlyOnce`

248 This expresses the ExactlyOnce Delivery Assurance defined in [].

249 `/wsrmp:RMAssertion/wsp:Policy/wsrmp:DeliveryAssurance/wsp:Policy/wsrmp:AtLeastOnce`

250 This expresses the AtLeastOnce Delivery Assurance defined in [].

251 `/wsrmp:RMAssertion/wsp:Policy/wsrmp:DeliveryAssurance/wsp:Policy/wsrmp:AtMostOnce`

252 This expresses the AtMostOnce Delivery Assurance defined in [].

253 `/wsrmp:RMAssertion/wsp:Policy/wsrmp:DeliveryAssurance/wsp:Policy/wsrmp:InOrder`

254 This expresses the InOrder Delivery Assurance defined in [].

255 `/wsrmp:RMAssertion/{any}`

256 This is an extensibility mechanism to allow different (extensible) types of information, based on a
257 schema, to be passed.

258 `/wsrmp:RMAssertion/@{any}`

259 This is an extensibility mechanism to allow different (extensible) types of information, based on a
260 schema, to be passed.

261 **2.3 Assertion Attachment**

262 The RM policy assertion is allowed to have the following Policy Subjects [[WS-PolicyAttachment](#)]:

- 263 ● Endpoint Policy Subject

264 ● Message Policy Subject

265 WS-PolicyAttachment defines a set of WSDL/1.1 policy attachment points for each of the above Policy
266 Subjects. Since an RM policy assertion specifies a concrete behavior, it MUST NOT be attached to the
267 abstract WSDL policy attachment points.

268 The following is the list of WSDL/1.1 elements whose scope contains the Policy Subjects allowed for an
269 RM policy assertion but which MUST NOT have RM policy assertions attached:

- 270 • wsdl:message
- 271 • wsdl:portType/wsdl:operation/wsdl:input
- 272 • wsdl:portType/wsdl:operation/wsdl:output
- 273 • wsdl:portType/wsdl:operation/wsdl:fault
- 274 • wsdl:portType

275 The following is the list of WSDL/1.1 elements whose scope contains the Policy Subjects allowed for an
276 RM policy assertion and which MAY have RM policy assertions attached:

- 277 • wsdl:port
- 278 • wsdl:binding
- 279 • wsdl:binding/wsdl:operation/wsdl:input
- 280 • wsdl:binding/wsdl:operation/wsdl:output
- 281 • wsdl:binding/wsdl:operation/wsdl:fault

282 If an RM policy assertion is attached to any of:

- 283 • wsdl:binding/wsdl:operation/wsdl:input
- 284 • wsdl:binding/wsdl:operation/wsdl:output
- 285 • wsdl:binding/wsdl:operation/wsdl:fault

286 then an RM policy assertion, specifying `wsp:Optional=true` MUST be attached to the corresponding
287 `wsdl:binding` or `wsdl:port`, indicating that the endpoint supports WS-RM. Any messages, regardless of
288 whether they have an attached Message Policy Subject RM policy assertion, MAY be sent to that endpoint
289 using WS-RM. Additionally, the receiving endpoint MUST NOT reject any message belonging to a
290 Sequence, simply because there was no Message Policy Subject RM policy assertion attached to that
291 message. There might be certain RM implementations that are incapable of applying RM Quality of
292 Service (QoS) semantics on a per-message basis. In order to ensure the broadest interoperability,
293 when an endpoint decorates its WSDL with RM policy assertions using Message Policy Subject, it MUST
294 also be prepared to accept that all messages sent to that endpoint might be sent within the context of an
295 RM Sequence, regardless of whether the corresponding `wsdl:input`, `wsdl:output` or `wsdl:fault` had an
296 attached RM policy assertion.

297 Rather than turn away messages that were unnecessarily sent with RM semantics, the receiving endpoint
298 described by the WSDL MUST accept these messages.

299 By attaching an RM policy assertion that specifies `wsp:Optional="true"` to the corresponding endpoint that
300 has attached RM policy assertions at the Message Policy Subject level, the endpoint is describing the
301 above constraint in policy.

302 In the case where an optional RM Assertion applies to an output message, there is no requirement on the
303 client to support an RM Destination implementation

304 2.4 Assertion Example

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

306 Table 2: Example policy with RM policy assertion

```
307 (01) <wsdl:definitions
308 (02)   targetNamespace="example.com"
309 (03)   xmlns:tns="example.com"
310 (04)   xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
311 (05)   xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy"
312 (06)   xmlns:wsrmp="http://docs.oasis-open.org/ws-rx/wsrmp/200702608"
313 (07)   xmlns:wssu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-
314 wss-wssecurity-utility-1.0.xsd">
315 (08)
316 (09) <wsp:UsingPolicy wsdl:required="true" />
317 (10)
318 (11) <wsp:Policy wsu:Id="MyPolicy" >
319 (12)   <wsrmp:RMAssertion/>
320 (13)   <wsp:Policy/>
321 (14) </wsrmp:RMAssertion3) <!-- omitted assertions -->
322 (15) <!-- omitted assertions --4) </wsp:Policy>
323 (16) </wsp:Policy>5)
324 (16) <!-- omitted elements -->
325 (17)
326 (18) <!-- omitted elements --wsdl:binding name="MyBinding"
327 type="tns:MyPortType"-->
328 (19) <wsp:PolicyReference URI="#MyPolicy" />
329 (20) <wsdl:binding name="MyBinding" type="tns:MyPortType" <!-- omitted
330 elements -->
331 (21) <wsp:PolicyReference URI="#MyPolicy" /></wsdl:binding>
332 (22) <!-- omitted elements -->
333 (23) </wsdl:binding</wsdl:definitions>
334 (24)
335 (25) </wsdl:definitions>
```

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

337 Lines (11-16) are a policy expression that includes a RM policy assertion (lines 12-14) are a policy
338 expression that includes a RM policy assertion (Line 12) to indicate that WS-ReliableMessaging must be
339 used.

340 Lines (20-23) are a WSDL binding. Line (21) indicates that the policy in lines (11-16) is a WSDL
341 binding. Line (19) indicates that the policy in Lines (11-14) applies to this binding, specifically indicating
342 that WS-ReliableMessaging must be used over all the messages in the binding.

343 2.5 Sequence Security Policy

344 WS-SecurityPolicy [SecurityPolicy] provides a framework and grammar for expressing the security
345 requirements and characteristics of entities in a XML web services based system. The following
346 assertions MAY be used in conjunction with WS-SecurityPolicy to express additional security
347 requirements particular to RM Sequences.

348 2.5.1 RM Assertion with Sequence STR Assertion

349 This ~~version of the RM assertion includassertion-defin~~es the requirement that an RM Sequence MUST be
350 bound to an explicit token that is referenced from a wsse:SecurityTokenReference in the
351 CreateSequence message.

352 This assertion MUST apply to [Endpoint Policy Subject]. ~~The normative outline for this form of the~~
353 ~~Sequence STR Assertion is:is-assertion MUST NOT be used for an endpoint that does not also use the~~
354 ~~RM-assertion:~~

```
355 <wsrmp:RMAssertion [wsp:Optional="true"]? ...>  
356 <wsp:Policy>  
357 <wsrmp:SequenceSTR/>  
358 <wsp:Policy>  
359 </wsrmp:RMAssertion>
```

360 ~~The following describes the content model of the SequenceSTR element.~~

361 ~~The normative outline for the Sequence STR Assertion is:~~

```
362 <wsrmp:SequenceSTR [wsp:Optional="true"]? ... />
```

363 /wsrmp:SequenceSTR

364 A policy assertion that specifies security requirements which MUST be used with an RM Sequence that
365 are particular to WS-RM and beyond what can be expressed in WS-SecurityPolicy.

366 **2.5.2 RM Assertion with Sequence Transport Security Assertion**

367 ~~This version of the RM assertion includes the requirement that an RM Sequence MUST be bound to the~~
368 ~~session(s) of the underlying transport-level security protocol (e.g. SSL/TLS) used to carry the~~
369 ~~CreateSequence and CreateSequenceResponse messages.~~

370 ~~This assertion MUST apply to [Endpoint Policy Subject]. This assertion MUST be used in conjunction with~~
371 ~~the sp:TransportBinding assertion that requires the use of some transport-level security mechanism~~
372 ~~(e.g. sp:HttpsToken).~~

373 ~~The normative outline for this form of the RM Assertion with the Sequence Transport Security Assertion is:~~

```
374 <wsp:Policy>  
375 <wsp:ExactlyOne>  
376 <wsp>All>  
377 <wsrm:RMAssertion [wsp:Optional="true"]> ...>  
378 <wsp:Policy>  
379 <wsrmp:SequenceTransportSecurity/>  
380 </wsp:Policy>  
381 </wsrm:RMAssertion>  
382 <sp:TransportBinding ...>  
383 ...  
384 </sp:TransportBinding>  
385 <wsp>All>  
386 <wsp:ExactlyOne>  
387 </wsp:Policy>
```

388 ~~The following describes the content model of the SequenceTransportSecurity element.~~

389 ~~/wsrm:SequenceSTR /@wsp:Optional="true"~~

390 ~~Per WS-Policy, this is compact notation for two policy alternatives, one with and one without the assertion.~~
391 ~~The intuition is that the behavior indicated by the assertion is optional, or in this case, that the RM~~
392 ~~Sequence binding to a specific token MAY be used.~~

393 **1.1.1 Sequence Transport Security Assertion**

394 ~~This assertion defines the requirement that an RM Sequence MUST be bound to the session(s) of the~~
395 ~~underlying transport-level security protocol (e.g. SSL/TLS) used to carry the CreateSequence and~~
396 ~~CreateSequenceResponse messages.~~

397 ~~This assertion MUST apply to [Endpoint Policy Subject]. This assertion is effectively meaningless unless it~~
398 ~~occurs in conjunction with the RMAssertion and a sp:TransportBinding assertion that requires the~~
399 ~~use of some transport-level security mechanism (e.g. sp:HttpsToken).~~

400 ~~The normative outline for the Sequence Transport Security Assertion is:~~

```
401 <wsrmp:SequenceTransportSecurity [wsp:Optional="true"]? ... />
```

402 ~~/wsrmp:SequenceTransportSecurity~~

403 ~~A policy assertion that specifies that any Sequences targeted to the indicated endpoint MUST be bound to~~
404 ~~the underlying session(s) of the transport-level security used to carry messages related to the Sequence.~~

405 ~~This form of the RM Assertion says that an endpoint MAY have RM as an option but always requires~~
406 ~~HTTPS to be used. All the SequenceTransportSecurity assertion indicates is that RM's rules for protecting~~
407 ~~the Sequence over TLS are followed.~~

408 ~~/wsrmp:SequenceTransportSecurity /@wsp:Optional="true"~~

409 ~~Per WS-Policy, this is compact notation for two policy alternatives, one with and one without the assertion.~~
410 ~~The meaning is that the behavior indicated by the assertion is optional, or in this case, that the binding of~~
411 ~~RM Sequences to transport-level security sessions MAY be used.~~

412 **3 Security Considerations**

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

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

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

421 **4 References**

422 **4.1 Normative**

423 **[KEYWORDS]**

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

426 <http://www.ietf.org/rfc/rfc2119.txt>

427 **[SOAP 1.1]**

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

429 <http://www.w3.org/TR/2000/NOTE-SOAP-20000508/>

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443 <http://www.w3.org/Submission/2006/SUBM-WS-Policy-20060425/>

444 **[WS-PolicyAttachment]**

445 W3C Member Submission, "Web Services Policy Attachment (WS-PolicyAttachment)," April 2006.

446 [http://www.w3.org/Submission/2006/SUBM-WS-PolicyAttachment-
447 20060425/](http://www.w3.org/Submission/2006/SUBM-WS-PolicyAttachment-20060425/)

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450 <http://www.w3.org/TR/2001/NOTE-wsdl-20010315>

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452 W3C Recommendation, "Extensible Markup Language (XML) 1.0 (~~Fourth Edition~~). ~~September~~
453 ~~2006~~Second Edition", ~~October 2000~~.

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455 **[XML-ns]**

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

457 <http://www.w3.org/TR/1999/REC-xml-names-19990114/>

458 **[XML-Schema Part1]**

459 W3C Recommendation, "XML Schema Part 1: Structures," ~~October 2004~~ May 2001.

460 <http://www.w3.org/TR/xmlschema-1/>

461 **[XML-Schema Part2]**

462 W3C Recommendation, "XML Schema Part 2: Datatypes," ~~October 2004~~ May 2001.

463 <http://www.w3.org/TR/xmlschema-2/>

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465 W3C Recommendation, "XML Path Language (XPath) Version 1.0," 16 November 1999.

466 <http://www.w3.org/TR/xpath>

467 **4.2 Non Normative**

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470 <http://www.openhealth.org/RDDL/20040118/rddl-20040118.html>

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472 G. Della-Libra, et. al. "Web Services Security Policy Language (WS-SecurityPolicy)", July 2005

473 <http://specs.xmlsoap.org/ws/2005/07/securitypolicy/ws-securitypolicy.pdf>

474 **[WS-Security]**

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480 [http://www.oasis-open.org/committees/download.php/16790/wss-v1.1-](http://www.oasis-open.org/committees/download.php/16790/wss-v1.1-spec-os-SOAPMessageSecurity.pdf)

481 [spec-os-SOAPMessageSecurity.pdf](http://www.oasis-open.org/committees/download.php/16790/wss-v1.1-spec-os-SOAPMessageSecurity.pdf)

482 **Appendix A. Acknowledgments**

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516 Appendix B. XML Schema

517 A normative copy of the XML Schema [XML-Schema Part1, XML-Schema Part2] description for this
518 specification may be retrieved from the following address:

519 <http://docs.oasis-open.org/ws-rx/wsrmp/200702/wsrmp-1.1-schema-200702608/wsrmp-1.1-schema-200608.xsd>
520

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```
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559 MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
560 -->
561 <xs:schema xmlns:tns="http://docs.oasis-open.org/ws-rx/wsrmp/200608"
562 xmlns:xs="http://www.w3.org/2001/XMLSchema"
563 targetNamespace="http://docs.oasis-open.org/ws-rx/wsrmp/200608"
564 elementFormDefault="qualified" attributeFormDefault="unqualified">
565 <xs:element name="RMAssertion">
566 OASIS trademark, IPR and other policies apply. -->
567 <xs:schema xmlns:tns="http://docs.oasis-open.org/ws-rx/wsrmp/200702"
568 xmlns:xs="http://www.w3.org/2001/XMLSchema"
569 targetNamespace="http://docs.oasis-open.org/ws-rx/wsrmp/200702"
570 elementFormDefault="qualified" attributeFormDefault="unqualified">
571 <xs:element name="RMAssertion">
```

```

572     <xs:complexType>
573     <xs:sequence>
574         <xs:any namespace="##other" processContents="lax" minOccurs="0"
575 maxOccurs
576     </xs:sequence>
577     <xs:anyAttribute namespace="##any" processContents="lax"/>
578 </xs:complexType>
579 </xs:element>
580 <xs:element name="SequenceSTR">
581     <xs:complexType>
582     <xs:sequence/>
583     <xs:anyAttribute namespace="##any" processContents="lax"/>
584 </xs:complexType>
585 </xs:element>
586 <xs:element name="SequenceTransportSecurity">
587     <xs:complexType>
588     <xs:sequence/>
589     <xs:anyAttribute namespace="##any" processContents="lax"/>
590 </xs:complexType>
591 </xs:element>
592 </xs:schema>

593 <xs:element name="DeliveryAssurance">
594     <xs:complexType>
595     <xs:sequence>
596         <xs:any namespace="##any" processContents="lax" minOccurs="0"
597 maxOccurs="unbounded"/>
598     </xs:sequence>
599 </xs:complexType>
600 </xs:element>
601 <xs:element name="ExactlyOnce">
602     <xs:complexType>
603     <xs:sequence/>
604 </xs:complexType>
605 </xs:element>
606 <xs:element name="AtLeastOnce">
607     <xs:complexType>
608     <xs:sequence/>
609 </xs:complexType>
610 </xs:element>
611 <xs:element name="AtMostOnce">
612     <xs:complexType>
613     <xs:sequence/>
614 </xs:complexType>
615 </xs:element>
616 <xs:element name="InOrder">
617     <xs:complexType>
618     <xs:sequence/>
619 </xs:complexType>
620 </xs:element>
621 </xs:schema>

```

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
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
wd-2	2005-12-05	Anish Karmarkar	Applied resolution of i055
wd-2	2005-12-05	Ümit Yalçinalp	Changed fixed date in footer to current date
wd-3	2005-12-21	Doug Davis	Added i050
wd-3	2005-12-23	Ümit Yalçinalp	i057 resolution
wd-3	2005-12-23	Ümit Yalçinalp	Changed the ref to WS-RM to the WS-RX committee.

Revision	Date	By Whom	What
			draft instead of original version Fixed Dug's email address
wd-3	2005-12-23	Ümit Yalçınalp	I060 resolution
wd-03	2005-12-27	Gilbert Pilz	Remove schema example and put it in its own artifact (wsrmp-1.1-schema-200510.xsd). Convert source file to OpenDocument format. Make line numbers all the same style.
wd-03	2005-12-28	Anish Karmarkar	Included a section link to c:\temp\wsrmp-1.1-schema-200510.xsd
wd-03	2006-01-04	Gilbert Pilz	Fixed formatting of included section.
wd-03	2006-01-05	Gilbert Pilz	Fix closing tag of normative outline for RMAssertion.
wd-04	2006-11-11	Doug Davis	Minor tweaks/typos
wd-05	2006-01-23	Gilbert Pilz	Start wd-05 by accepting all changes from wd-04
wd-06	2006-01-23	Doug Davis	Minor typos found by Marc
wd-06	2006-02-14	Doug Davis	Issue 075 resolution
wd-06	2006-02-14	Doug Davis	Issues 086, 087 resolutions
wd-06	2006-02-15	Gilbert Pilz	Issue 088; added link for namespace URI; added text describing link; added non-normative reference for RDDL 2.0
wd-06	2006-02-17	Anish Karmarkar	Removed a sentence in section 2.1 that talked about RM assertion parameters, as there aren't any.
wd-06	2006-02-17	Anish Karmarkar	Change the namespace to 200602.
wd-07	2006-02-22	Doug Davis	Accept all changes to create new WD Minor typo fixed – thanks to Paul Cotton
wd-07	2006-02-23	Doug Davis	Added missing namespace table entries - MarcG
wd-07	2006-03-08	Doug Davis	Issue 097 applied
wd-08	2006-04-11	Doug Davis	Issue 021 applied
wd-08	2006-04-24	Gilbert Pilz	Misc cleanups prior to publishing to TC.
wd-09	2006-05-29	Gilbert Pilz	Issue 117 applied
wd-10	2006-06-05	Gilbert Pilz	Accept all changes; bump WD number
wd-10	2006-06-07	Doug Davis	Applied lots of minor edits from Marc Goodner
wd-10	2006-06-13	Doug Davis	Applied a couple of minor edits
wd-10	2006-07-21	Doug Davis	Issues 122-124 applied

Revision	Date	By Whom	What
wd-10	2006-07-27	Doug Davis	Copied list of TC members from RM spec (i134)
wd-10	2006-08-04	Doug Davis	Updated old namespaces – found by PaulC
wd-10	2006-08-04	Doug Davis	Verify all [refs]
wd-10	2006-08-04	Doug Davis	Change namespace to 2006/08
cd-04	2006-08-11	Doug Davis	Issue 158 applied
cd-04	2006-08-16	Gilbert Pilz	Fix date at 08/11/2006; formatting changes for better HTML rendering.
wd-11	2006-10-25	Doug Davis	Accept all changes, update to wd11
wd-11	2006-10-26	Doug Davis	PR004 applied
wd-11	2007-01-26	Doug Davis	PR037 applied
wd-12	2007-01-31	Doug Davis	Lots of typos from MarcG Updated WD number and date
wd-12	2007-02-01	Doug Davis	PR035 (009,020 dups) applied

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wd-10	2006-07-21	Doug Davis	Issues 122-124 applied
wd-10	2006-07-27	Doug Davis	Copied list of TC members from RM spec (i134)
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wd-10	2006-08-04	Doug Davis	Verify all [refs]
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ed-04	2006-08-11	Doug Davis	Issue 158 applied
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