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

5 **Committee Draft 01, October 19<sup>th</sup> 2005**

6 **~~Working Draft 01, July 6<sup>th</sup> 2005~~**

7 -

8 **Document identifier:**

9 [wsrmp-1.1-spec-cd-01](#)

10 ~~WS-ReliableMessagingPolicy-1.0draft-01.sxw~~

11 **Location:**

12 <http://docs.oasis-open.org/ws-rx/wsrmp/200510/wsrmp-1.1-spec-cd-01.pdf>~~2005/07/WS-~~  
13 ~~ReliableMessagingPolicy-1.0-draft-01.sxw~~

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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.**BD**

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.

## 127 1.3 Namespace

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

130 [http://docs.oasis-](http://docs.oasis-open.org/wsrmp/200510/schemas.xmlsoap.org/ws/2005/02/rm/policy)  
131 [open.org/wsrmp/200510/schemas.xmlsoap.org/ws/2005/02/rm/policy](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*

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

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

199 -

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

207 -

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

209 /wsrm:p:RMAssertion

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

212 /wsrm:p: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 /wsrm:p:RMAssertion/wsrm:InactivityTimeout

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

219 /wsrm:p:RMAssertion/wsrm:InactivityTimeout/@Milliseconds

220 The inactivity timeout duration, specified in milliseconds.

221 /wsrm:p:RMAssertion/wsrm: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 /wsrm:p:RMAssertion/wsrm:BaseRetransmissionInterval/@Milliseconds

225 The base retransmission interval, specified in milliseconds.

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226 /wsrm:p:RMAssertion/wsrm: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 /wsrm:p:RMAssertion/wsrm: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 /wsrm:p:RMAssertion/wsrm:AcknowledgementInterval/@Milliseconds  
 233 The acknowledgement interval, specified in milliseconds.

234 /wsrm:p:RMAssertion/wsrm: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 /wsrm:p:RMAssertion/wsrm: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 wsrm: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 wsrm:CreateSequence request containing a~~  
 260 ~~wsrm: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 wsrm:CreateSequence~~  
 262 ~~request that does not contain a wsrm: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/"xmlns:ws="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

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 -  
398 -  
399 -

400 **Appendix A. Acknowledgments**

401 This document is based on initial contribution to OASIS WS-RX Technical Committee by the  
402 following authors: Stefan Batres, Microsoft (Editor), Ruslan Bilorusets, BEA, Don Box, Microsoft,  
403 Luis Felipe Cabrera, Microsoft, Derek Collison, TIBCO Software, Donald Ferguson, IBM,  
404 Christopher Ferris, IBM (Editor), Tom Freund, IBM, Mary Ann Hondo, IBM, John Ibbotson, IBM,  
405 Lei Jin, BEA, Chris Kaler, Microsoft, David Langworthy, Microsoft, Amelia Lewis, TIBCO Software,  
406 Rodney Limprecht, Microsoft, Steve Lucco, Microsoft, Don Mullen, TIBCO Software, Anthony  
407 Nadalin, IBM, Mark Nottingham, BEA, David Orchard, BEA, Shivajee Samdarshi, TIBCO  
408 Software, John Shewchuk, Microsoft, Tony Storey, IBM.-

409 -

410 The following individuals have provided invaluable input into the initial contribution:

411 Keith Ballinger, Microsoft, Allen Brown, Microsoft, Michael Conner, IBM, Francisco Curbera, IBM,  
412 Steve Graham, IBM, Pat Helland, Microsoft, Rick Hill, Microsoft, Scott Hinkelman, IBM, Tim  
413 Holloway, IBM, Efim Hudis, Microsoft, Johannes Klein, Microsoft, Frank Leymann, IBM, Martin  
414 Nally, IBM, Peter Niblett, IBM, Jeffrey Schlimmer, Microsoft, Chris Sharp, IBM, James Snell, IBM,  
415 Keith Stobie, Microsoft, Satish Thatte, Microsoft, Stephen Todd, IBM, Sanjiva Weerawarana, IBM,  
416 Roger Wolter, Microsoft.-

417 -

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

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421 TBD

422 -



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>

427 -  
428 -

```
429 <?xml version="1.0" encoding="UTF-8"?>
430 <!--
431
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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"

```

```

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**

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

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

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Date

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