# Web Services Reliable Messaging Policy Assertion (WS-RM Policy)

## Committee Draft 01, October 19th 2005

**Document identifier:**

wsrmp-1.1-spec-cd-01

**Location:**

http://docs.oasis-open.org/ws-rx/wsrmp/200510/wsrmp-1.1-spec-cd-01.pdf

**Editors:**

Gilbert Pilz, BEA <gilbert.pilz@bea.com>
Anish Karmarkar, Oracle <Anish.Karmarkar@oracle.com>
Ümit Yalçinalp, SAP <umit.yalcinalp@sap.com>
TBD

**Contributors:**

TBD

**Abstract:**

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

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

**Status:**

This document is a Committee Draft.

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

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

# Table of Contents

# 1 Introduction

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

## 1.1 Goals and Requirements

### 1.1.1 Requirements

## 1.2 Notational Conventions

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

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

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

## 1.3 Namespace

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

**http://docs.oasis-open.org/wsrmp/200510/**

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

The following namespaces are used in this document:

*Table Number range Table*

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

## 1.4 Compliance

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

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

# 2 RM Policy Assertions

WS-Policy Framework [WS-Policy] 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 [WS-RM] to ensure reliable message delivery. 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.

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

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

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

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

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

## 2.2 Normative Outline

The normative outline for the RM version assertion is:

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

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

/wsrmp:RMAssertion

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

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

Per WS-Policy [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/wsrm:InactivityTimeout

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

/wsrmp:RMAssertion/wsrm:InactivityTimeout/@Milliseconds

The inactivity timeout duration, specified in milliseconds.

/wsrmp:RMAssertion/wsrm:BaseRetransmissionInterval

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

/wsrmp:RMAssertion/wsrm:BaseRetransmissionInterval/@Milliseconds

The base retransmission interval, specified in milliseconds.

/wsrmp:RMAssertion/wsrm:ExponentialBackoff

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

/wsrmp:RMAssertion/wsrm:AcknowledgementInterval

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

/wsrmp:RMAssertion/wsrm:AcknowledgementInterval/@Milliseconds

The acknowledgement interval, specified in milliseconds.

/wsrmp:RMAssertion/wsrm:MaxMessageNumber

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

/wsrmp:RMAssertion/wsrm:MaxMessageNumber/@Number

The maximum message number.

## 2.3 Assertion Attachment

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

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

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

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

## 2.4 Assertion Example

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

Table 2: Example policy with RM policy assertion

```
(01)<wsdl:definitions
(02)    targetNamespace="example.com"
(03)    xmlns:tns="example.com"
(04)    xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
(05)    xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy"
(06)    xmlns:wsrmp="http://docs.oasis-open.org/wsrmp/200510/"
(07)    xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-
wss-wssecurity-utility-1.0.xsd" >
(08)
(09) <wsp:UsingPolicy wsdl:required="true" />
(10)
(11) <wsp:Policy wsu:Id="MyPolicy" >
(12)   <wsrmp:RMAssertion>
(13)     <wsrmp:InactivityTimeout Milliseconds="600000" />
(14)     <wsrmp:BaseRetransmissionInterval Milliseconds="3000" />
(15)     <wsrmp:ExponentialBackoff />
(16)     <wsrmp:AcknowledgementInterval Milliseconds="200" />
```



 

```
(17)    </wsrmp:RMAssertion>
(18)   <!-- omitted assertions -->
(19) </wsp:Policy>
(20)
(21) <!-- omitted elements -->
(22)
(23) <wsdl:binding name="MyBinding" type="tns:MyPortType" >
(24)     <wsp:PolicyReference URI="#MyPolicy" />
(25)     <!-- omitted elements -->
(26) </wsdl:binding>
(27)
(28)</wsdl:definitions>
(29)
```

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

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

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

## 2.5 Delivery Assurance

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

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

The normative outline of a Delivery Assurance is

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

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

/wsrmp:DeliveryAssertion

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

/wsrmp:DeliveryAssertion/@mode

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

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

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

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

/wsrmp:DeliveryAssertion/@ordered

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

# 3 Security Considerations

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

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

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

# 4 References

## 4.1 Normative

## 4.2 Non-Normative


**[KEYWORDS]** S. Bradner, "Key words for use in RFCs to Indicate Requirement Levels," RFC 2119, Harvard University, March 1997.

**[SOAP]** W3C Note, "SOAP: Simple Object Access Protocol 1.1," 08 May 2000.

**[Tanenbaum]** "Computer Networks," Andrew S. Tanenbaum, Prentice Hall PTR, 2003.

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

**[WS-RM]** R. Bilorusets, et all, "Web Services Reliable Messaging (WS-ReliableMessaging)," February 2005.

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

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

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

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

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

**[XML-ns]** W3C Recommendation, "Namespaces in XML," 14 January 1999.

**[XML-Schema1]** W3C Recommendation, "XML Schema Part 1: Structures," 2 May 2001.

**[XML-Schema2]**W3C Recommendation, "XML Schema Part 2: Datatypes," 2 May 2001.

# Appendix A. Acknowledgments

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

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

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

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

TBD



 

# Appendix B. XML Schema

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

http://docs.oasis-open.org/wsrmp/200510/wsrm-policy.xsd

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

OASIS takes no position regarding the validity or scope of any
intellectual property or other rights that might be claimed to pertain
to the implementation or use of the technology described in this
document or the extent to which any license under such rights might or
might not be available; neither does it represent that it has made any
effort to identify any such rights. Information on OASIS's procedures
with respect to rights in OASIS specifications can be found at the
OASIS website. Copies of claims of rights made available for
publication and any assurances of licenses to be made available, or the
result of an attempt made to obtain a general license or permission for
the use of such proprietary rights by implementors or users of this
specification, can be obtained from the OASIS Executive Director.

OASIS invites any interested party to bring to its attention any
copyrights, patents or patent applications, or other proprietary rights
which may cover technology that may be required to implement this
specification. Please address the information to the OASIS Executive
Director.

Copyright (C) OASIS Open (2005). All Rights Reserved.

This document and translations of it may be copied and furnished to
others, and derivative works that comment on or otherwise explain it or
assist in its implementation may be prepared, copied, published and
distributed, in whole or in part, without restriction of any kind,
provided that the above copyright notice and this paragraph are
included on all such copies and derivative works. However, this
document itself may not be modified in any way, such as by removing the
copyright notice or references to OASIS, except as needed for the
purpose of developing OASIS specifications, in which case the
procedures for copyrights defined in the OASIS Intellectual Property
Rights document must be followed, or as required to translate it into
languages other than English.

```

```
The limited permissions granted above are perpetual and will not be
revoked by OASIS or its successors or assigns.

This document and the information contained herein is provided on an
"AS IS" basis and OASIS DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED,
INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE
INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED
WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
-->
<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" >
          <xs:complexType>
            <xs:attribute name="Number"
                          type="xs:unsignedLong"
                          use="required" />
            <xs:anyAttribute namespace="##any" processContents="lax" />
          </xs:complexType>
        </xs:element>
        <xs:any namespace="##other"
                processContents="lax"
                minOccurs="0"
                maxOccurs="unbounded" />
      </xs:sequence>
      <xs:anyAttribute namespace="##any" processContents="lax" />
    </xs:complexType>
  </xs:element>

</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<br>Applied resolution i015/16 (doc identifier)<br>Partial application of i017, final yyyy/mm required, changed doc URI to TBD pending yyyy/mm<br>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 yyyymm.<br>Added resolution of i009 |
| 1.1-wd-01.swx | 2005-10-06 | Ümit Yalçinalp | Editorial fixes suggested by Anish<br>Updated wd draft date to October 6th |
| 1.1-wd-01.swx | 2005-10-19 | Ümit Yalçinalp | Editorial change to remove .sxw suffix from doc id |

# Appendix D. Notices

OASIS takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights. Information on OASIS's procedures with respect to rights in OASIS specifications can be found at the OASIS website. Copies of claims of rights made available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementors or users of this specification, can be obtained from the OASIS Executive Director.

OASIS invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights which may cover technology that may be required to implement this specification. Please address the information to the OASIS Executive Director.