

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

February 2005

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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](#)].

Composable Architecture

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

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Acknowledgements

The following individuals have provided invaluable input into the design of this specification:

- 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

We wish to thank the technical writers and development reviewers who provided feedback to improve the readability of the specification.

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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 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 Table 1) are used to indicate the namespace of the element being defined.

1.2 Namespace

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

<http://schemas.xmlsoap.org/ws/2005/02/rm/policy>

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

Table 1: Prefixes and XML namespaces used in this specification

Prefix	Namespace	Specification
wsp	http://schemas.xmlsoap.org/ws/2004/09/policy	[WS-Policy]
wstrm	http://schemas.xmlsoap.org/ws/2005/02/rm/policy	This specification

1.3 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 Section 1.2 Namespace) 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 Assertion

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](#)].

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 `wsrn: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:

```
<wsrm:RMAssertion [wsp:Optional="true"]? ... >
  <wsrm:InactivityTimeout Milliseconds="xs:unsignedLong" ... /> ?
  <wsrm:BaseRetransmissionInterval Milliseconds="xs:unsignedLong" .../>?
  <wsrm:ExponentialBackoff ... /> ?
  <wsrm:AcknowledgementInterval Milliseconds="xs:unsignedLong" ... /> ?
  ...
</wsrm:RMAssertion>
```

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

`/wsrm:RMAssertion`

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

`/wsrm: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.

`/wsrm:RMAssertion/wsrm:InactivityTimeout`

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

`/wsrm:RMAssertion/wsrm:InactivityTimeout/@Milliseconds`

The inactivity timeout duration, specified in milliseconds.

`/wsrm: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.

`/wsrm:RMAssertion/wsrm:BaseRetransmissionInterval/@Milliseconds`

The base retransmission interval, specified in milliseconds.

`/wsrm: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.

`/wsrm: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.

`/wsrm:RMAssertion/wsrm:AcknowledgementInterval/@Milliseconds`

The acknowledgement interval, specified in milliseconds.

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.

Per WS-ReliableMessaging [[WS-RM](#)], a wsrn:CreateSequence request MAY contain an offer to create an "inbound" Sequence. If the RM policy assertion is attached to an endpoint declaring only input messages, the endpoint MUST reject a wsrn:CreateSequence request containing a wsrn:Offer to create a corresponding Sequence. If the assertion is attached to an endpoint declaring both input and output messages, the endpoint MUST reject a wsrn:CreateSequence request that does not contain a wsrn:Offer to create a corresponding Sequence.

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:wsm="http://schemas.xmlsoap.org/ws/2005/02/rm/policy"
(07)     xmlns:wss="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)         <wsm:RMAssertion>
(13)             <wsm:InactivityTimeout Milliseconds="600000" />
(14)             <wsm:BaseRetransmissionInterval Milliseconds="3000" />
(15)             <wsm:ExponentialBackoff />
(16)             <wsm:AcknowledgementInterval Milliseconds="200" />
(17)         </wsm: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 be 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.

3. Security Considerations

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

It is RECOMMENDED 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

[KEYWORDS]

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[WS-RM]

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[WS-Policy]

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[WS-PolicyAttachment]

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[WSS]

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[XML]

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[XML-ns]

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[XML-Schema1]

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[XML-Schema2]

W3C Recommendation, "[XML Schema Part 2: Datatypes](#)," 2 May 2001.

Appendix I – 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://schemas.xmlsoap.org/ws/2005/02/rm/wsrp-policy.xsd>

A non-normative copy of the XML Schema description is listed below for convenience.

```
<xs:schema
  targetNamespace="http://schemas.xmlsoap.org/ws/2005/02/rm/policy"
  xmlns:tns="http://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"
        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>
```