Web Services ReliableMessaging Policy Assertion (WS-RM Policy) Version 1.1

Committee Draft 08

1 March 2007

Specification URIs:
This Version:
http://docs.oasis-open.org/ws-rx/wsrmp/200702/wsrmp-1.1-spec-cd-08.pdf
http://docs.oasis-open.org/ws-rx/wsrmp/200702/wsrmp-1.1-spec-cd-08.html
http://docs.oasis-open.org/ws-rx/wsrmp/200702/wsrmp-1.1-spec-cd-08.doc

Previous Version:
http://docs.oasis-open.org/ws-rx/wsrmp/200702/wsrmp-1.1-spec-cd-07.html
http://docs.oasis-open.org/ws-rx/wsrmp/200702/wsrmp-1.1-spec-cd-07.doc

Latest Version:
http://docs.oasis-open.org/ws-rx/wsrmp/v1.1/wsrmp.html
http://docs.oasis-open.org/ws-rx/wsrmp/v1.1/wsrmp.doc

Technical Committee:
OASIS Web Services Reliable Exchange (WS-RX) TC

Chairs:
Paul Fremantle <paul@wso2.com>
Sanjay Patil <sanjay.patil@sap.com>

Editors:
Doug Davis, IBM <dug@us.ibm.com>
Anish Karmarkar, Oracle <Anish.Karmarkar@oracle.com>
Gilbert Pilz, BEA <gpilz@bea.com>
Ümit Yalcinalp, SAP <umit.yalcinalp@sap.com>

Related Work:
This specification replaces or supercedes:
WS-ReliableMessaging Policy v1.0

Declared XML Namespaces:
http://docs.oasis-open.org/ws-rx/wsrmp/200702

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 1.1], [SOAP 1.2] 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.
This document was last revised or approved by the WS-RX on the above date. The level of approval is also listed above. Check the "Latest Version" or "Latest Approved Version" location noted above for possible later revisions of this document.

Technical Committee members should send comments on this specification to the Technical Committee's email list. Others should send comments to the Technical Committee by using the "Send A Comment" button on the Technical Committee's web page at http://www.oasis-open.org/committees/ws-rx/.

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).

The non-normative errata page for this specification is located at http://www.oasis-open.org/committees/ws-rx/.
Notices

Copyright © OASIS® 1993–2007. All Rights Reserved. OASIS trademark, IPR and other policies apply.

All capitalized terms in the following text have the meanings assigned to them in the OASIS Intellectual Property Rights Policy (the "OASIS IPR Policy"). The full Policy may be found at the OASIS website.

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 section are included on all such copies and derivative works. However, this document itself may not be modified in any way, including by removing the copyright notice or references to OASIS, except as needed for the purpose of developing any document or deliverable produced by an OASIS Technical Committee (in which case the rules applicable to copyrights, as set forth in the OASIS IPR Policy, 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 OWNERSHIP RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

OASIS requests that any OASIS Party or any other party that believes it has patent claims that would necessarily be infringed by implementations of this OASIS Committee Specification or OASIS Standard, to notify OASIS TC Administrator and provide an indication of its willingness to grant patent licenses to such patent claims in a manner consistent with the IPR Mode of the OASIS Technical Committee that produced this specification.

OASIS invites any party to contact the OASIS TC Administrator if it is aware of a claim of ownership of any patent claims that would necessarily be infringed by implementations of this specification by a patent holder that is not willing to provide a license to such patent claims in a manner consistent with the IPR Mode of the OASIS Technical Committee that produced this specification. OASIS may include such claims on its website, but disclaims any obligation to do so.

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' procedures with respect to rights in any document or deliverable produced by an OASIS Technical Committee can be found on 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 implementers or users of this OASIS Committee Specification or OASIS Standard, can be obtained from the OASIS TC Administrator. OASIS makes no representation that any information or list of intellectual property rights will at any time be complete, or that any claims in such list are, in fact, Essential Claims.

The name "OASIS", WS-ReliableMessaging Policy, WS-ReliableMessaging, WSRMP, WSRM, WS-RX are trademarks of OASIS, the owner and developer of this specification, and should be used only to refer to the organization and its official outputs. OASIS welcomes reference to, and implementation and use of, specifications, while reserving the right to enforce its marks against misleading uses. Please see http://www.oasis-open.org/who/trademark.php for above guidance.
<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>103</td>
<td>Introduction</td>
</tr>
<tr>
<td>104</td>
<td>1.1 Terminology</td>
</tr>
<tr>
<td>105</td>
<td>1.2 Normative</td>
</tr>
<tr>
<td>106</td>
<td>1.3 Non Normative</td>
</tr>
<tr>
<td>107</td>
<td>1.4 Namespace</td>
</tr>
<tr>
<td>108</td>
<td>1.5 Conformance</td>
</tr>
<tr>
<td>109</td>
<td>2 RM Policy Assertions</td>
</tr>
<tr>
<td>110</td>
<td>2.1 Assertion Model</td>
</tr>
<tr>
<td>111</td>
<td>2.2 Normative Outline</td>
</tr>
<tr>
<td>112</td>
<td>2.3 Assertion Attachment</td>
</tr>
<tr>
<td>113</td>
<td>2.4 Assertion Example</td>
</tr>
<tr>
<td>114</td>
<td>2.5 Sequence Security Policy</td>
</tr>
<tr>
<td>115</td>
<td>3 Security Considerations</td>
</tr>
<tr>
<td>116</td>
<td>Appendix A. Schema</td>
</tr>
<tr>
<td>117</td>
<td>Appendix B. Acknowledgments</td>
</tr>
<tr>
<td>118</td>
<td></td>
</tr>
</tbody>
</table>
1 Introduction

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

1.1 Terminology

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

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

- An element extensibility point is referred to using {any} in place of the element name. This indicates that any element name can be used, from any namespace other than the wsrm: namespace.
- An attribute extensibility point is referred to using @{any} in place of the attribute name. This indicates that any attribute name can be used, from any namespace other than the wsrm: namespace.

1.2 Normative


http://www.ietf.org/rfc/rfc2119.txt


http://www.w3.org/TR/2000/NOTE-SOAP-20000508/
1.3 Non Normative


1.4 Namespace

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

```
http://docs.oasis-open.org/ws-rx/wsrmp/200702
```

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

Table 1 lists the XML namespaces that are used in this specification. The choice of any namespace prefix is arbitrary and not semantically significant. The assertions defined within this specification have been designed to work independently of a specific version of WS-Policy and WS-Policy Attachment. Within this specification the use of the namespace prefix "wsp" refers generically to the WS-Policy namespace, not a specific version.

Table 1

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Namespace</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>wsd1</td>
<td><a href="http://schemas.xmlsoap.org/wsd1/">http://schemas.xmlsoap.org/wsd1/</a></td>
<td>[WSDL 1.1]</td>
</tr>
<tr>
<td>wsrmp</td>
<td><a href="http://docs.oasis-open.org/ws-rx/wsrmp/200702">http://docs.oasis-open.org/ws-rx/wsrmp/200702</a></td>
<td>This specification.</td>
</tr>
</tbody>
</table>

The normative schema for WS-ReliableMessaging can be found linked from the namespace document that is located at the namespace URI specified above.

All sections explicitly noted as examples are informational and are not to be considered normative.

1.5 Conformance

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 1.4) 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 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.

/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
When present, this assertion defines the requirement that an RM Sequence MUST be bound to an explicit token that is referenced from a wsse:SecurityTokenReference in the CreateSequence message. See section 2.5.1.
265  /wsrmp:RMAssertion/wsp:Policy/wsrmp:SequenceTransportSecurity
266  When present, this assertion defines the requirement that an RM Sequence MUST be bound to
267  the session(s) of the underlying transport-level protocol used to carry the CreateSequence and
268  CreateSequenceResponse message. When present, this assertion MUST be used in
269  conjunction with the sp:TransportBinding assertion, see section 2.5.2.
270  /wsrmp:RMAssertion/wsp:Policy/wsrmp:DeliveryAssurance
271  This expression, which may be omitted, describes the message delivery quality of service between
272  the RM and application layer. When used by an RM Destination it expresses the delivery
273  assurance in effect between the RM Destination and its corresponding application destination, and
274  it also indicates requirements on any RM Source that transmits messages to this RM destination.
275  Conversely when used by an RM Source it expresses the delivery assurance in effect between the
276  RM Source and its corresponding application source, as well as indicating requirements on any
277  RM Destination that receives messages from this RM Source. In either case the delivery
278  assurance does not affect the messages transmitted on the wire. Absence of this expression from
279  a wsrmp:RMAssertion policy assertion simply means that the endpoint has chosen not to
280  advertise its delivery assurance characteristics.
281  Note that when there are multiple policy alternatives of the RM Assertion, the Delivery Assurance
282  on each MUST NOT conflict.
283  /wsrmp:RMAssertion/wsp:Policy/wsrmp:DeliveryAssurance/wsp:Policy
284  This required element identifies additional requirements for the use of the
285  wsrmp:DeliveryAssurance.
287  This expresses the ExactlyOnce Delivery Assurance defined in [WS-RM].
289  This expresses the AtLeastOnce Delivery Assurance defined in [WS-RM].
290  /wsrmp:RMAssertion/wsp:Policy/wsrmp:DeliveryAssurance/wsp:Policy/wsrmp:AtMostOnce
291  This expresses the AtMostOnce Delivery Assurance defined in [WS-RM].
293  This expresses the InOrder Delivery Assurance defined in [WS-RM].
294  /wsrmp:RMAssertion/{any}
295  This is an extensibility mechanism to allow different (extensible) types of information, based on a
296  schema, to be passed.
297  /wsrmp:RMAssertion/@{any}
298  This is an extensibility mechanism to allow different (extensible) types of information, based on a
299  schema, to be passed.

300  **2.3 Assertion Attachment**

301  The RM policy assertion is allowed to have the following Policy Subjects [WS-PolicyAttachment]:
302  •   Endpoint Policy Subject
303  •   Message Policy Subject
WS-PolicyAttachment defines a set of WSDL/1.1 policy attachment points for each of the above Policy Subjects. Since an RM policy assertion specifies a concrete behavior, it MUST NOT be attached to the abstract WSDL policy attachment points.

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

- wsdl:message
- wsdl:portType/wsd1:operation/wsdl:input
- wsdl:portType/wsd1:operation/wsdl:output
- wsdl:portType/wsd1:operation/wsdl:fault
- wsdl:portType

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

- wsdl:port
- wsdl:binding
- wsdl:binding/wsd1:operation/wsdl:input
- wsdl:binding/wsd1:operation/wsdl:output
- wsdl:binding/wsd1:operation/wsdl:fault

If an RM policy assertion is attached to any of:

- wsdl:binding/wsd1:operation/wsdl:input
- wsdl:binding/wsd1:operation/wsdl:output
- wsdl:binding/wsd1:operation/wsdl:fault

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

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

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

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

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

**Table 2: Example policy with RM policy assertion**

```xml
(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/ws-rx/wsrmp/200702"
(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)     <wsp:Policy/>
(14) </wsrmp:RMAssertion>
(15) </wsp:Policy>
(16) </wsdl:definitions>
```

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

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

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

2.5 Sequence Security Policy

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

2.5.1 RM Assertion with Sequence STR Assertion

This version of the RM assertion includes the requirement that an RM Sequence MUST be bound to an explicit token that is referenced from a wsse:SecurityTokenReference in the CreateSequence message.

This assertion MUST apply to [Endpoint Policy Subject]. The normative outline for this form of the Sequence STR Assertion is:

```xml
<wsrmp:RMAssertion [wsp:Optional="true"]? ...
<wsp:Policy>
```
The following describes the content model of the `SequenceSTR` element.

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

### 2.5.2 RM Assertion with Sequence Transport Security Assertion

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

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

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

```xml
<wsp:Policy>
  <wsp:ExactlyOne>
    <wsp:All>
      <wsrm:RMAssertion [wsp:Optional="true"]> ...>
      <wsp:Policy>
        <wsrm:SequenceTransportSecurity/>
      </wsp:Policy>
      </wsrm:RMAssertion>
    </wsp:Policy>
    <sp:TransportBinding ...
    </wsp:Policy>
  </wsp:All>
</wsp:Policy>
```

The following describes the content model of the `SequenceTransportSecurity` element.

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

This form of the RM Assertion says that an endpoint MAY have RM as an option but always requires HTTPS to be used. All the `SequenceTransportSecurity` assertion indicates is that RM's rules for protecting the Sequence over TLS are followed.
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 [WS-Security] or embedded within other objects using object-specific security mechanisms.
Appendix A. Schema

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

http://docs.oasis-open.org/ws-rx/wsrmp/200702/wsrmp-1.1-schema-200702.xsd

The following copy is provided for reference.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!-- Copyright (C) OASIS (R) 1993-2007. All Rights Reserved. OASIS trademark, IPR and other policies apply. -->
<xs:schema xmlns:tns="http://docs.oasis-open.org/ws-rx/wsrmp/200702"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://docs.oasis-open.org/ws-rx/wsrmp/200702" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="RMAssertion">
    <xs:complexType>
      <xs:sequence>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="SequenceSTR">
    <xs:complexType>
      <xs:sequence/>
    </xs:complexType>
  </xs:element>
  <xs:element name="SequenceTransportSecurity">
    <xs:complexType>
      <xs:sequence/>
    </xs:complexType>
  </xs:element>
  <xs:element name="DeliveryAssurance">
    <xs:complexType>
      <xs:sequence/>
    </xs:complexType>
  </xs:element>
  <xs:element name="ExactlyOnce">
    <xs:complexType>
      <xs:sequence/>
    </xs:complexType>
  </xs:element>
  <xs:element name="AtLeastOnce">
    <xs:complexType>
      <xs:sequence/>
    </xs:complexType>
  </xs:element>
  <xs:element name="AtMostOnce">
    <xs:complexType>
      <xs:sequence/>
    </xs:complexType>
  </xs:element>
</xs:schema>
```
<xs:element name="InOrder">
  <xs:complexType>
    <xs:sequence/>
  </xs:complexType>
</xs:element>
</xs:schema>
Appendix B. Acknowledgments

This document is based on initial contribution to OASIS WS-RX Technical Committee by the following authors:

Stefan Batres-Editor, Microsoft  
Ruslan Bilorusets, BEA  
Don Box, Microsoft  
Luis Felipe Cabrera, Microsoft  
Derek Collison, TIBCO Software  
Donald Ferguson, IBM  
Christopher Ferris, IBM  
Tom Freund, IBM  
Lei Jin, BEA  
Chris Kaler, Microsoft  
Stefan Batres, Microsoft  
Ruslan Bilorusets, BEA  
Don Box, Microsoft  
Luis Felipe Cabrera, Microsoft  
Derek Collison, TIBCO Software  
Donald Ferguson, IBM  
Christopher Ferris, IBM  
Tom Freund, IBM  
Lei Jin, BEA  
Chris Kaler, Microsoft

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  
Abbie Barbir, Nortel  
Charlton Barreto, Adobe  
Stefan Batres, Microsoft  
Hamid Ben Malek, Fujitsu  
Andreas Bjarlstam, Ericsson  
Toufic Boubez, Layer 7  
Doug Bunting, Sun  
Lloyd Burch, Novell  
Steve Carter, Novell  
Martin Chapman, Oracle  
Dave Chappell, Sonic  
Paul Cotton, Microsoft  
Glen Daniels, Sonic  
Doug Davis, IBM  
Blake Dournaee, Intel  
Jacques Durand, Fujitsu  
Colleen Evans, Microsoft  
Christopher Ferris, IBM  
Paul Freemantle, WSO2  
Robert Freund, Hitachi  
Peter Furniss, Ereebor  
Marc Goodner, Microsoft

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

Abbie Barbir, Nortel  
Charlton Barreto, Adobe  
Stefan Batres, Microsoft  
Hamid Ben Malek, Fujitsu  
Andreas Bjarlstam, Ericsson  
Toufic Boubez, Layer 7  
Doug Bunting, Sun  
Lloyd Burch, Novell  
Steve Carter, Novell  
Martin Chapman, Oracle  
Dave Chappell, Sonic  
Paul Cotton, Microsoft  
Glen Daniels, Sonic  
Doug Davis, IBM  
Blake Dournaee, Intel  
Jacques Durand, Fujitsu  
Colleen Evans, Microsoft  
Christopher Ferris, IBM  
Paul Freemantle, WSO2  
Robert Freund, Hitachi  
Peter Furniss, Eerebor  
Marc Goodner, Microsoft
<table>
<thead>
<tr>
<th>Page</th>
<th>Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>593</td>
<td>Chouthri Palanisamy</td>
<td>NEC</td>
</tr>
<tr>
<td>594</td>
<td>Sanjay Patil</td>
<td>SAP</td>
</tr>
<tr>
<td>595</td>
<td>Gilbert Pilz</td>
<td>BEA</td>
</tr>
<tr>
<td>596</td>
<td>Martin Raepple</td>
<td>SAP</td>
</tr>
<tr>
<td>597</td>
<td>Eric Rajkovic</td>
<td>Oracle</td>
</tr>
<tr>
<td>598</td>
<td>Stefan Rossmanith</td>
<td>SAP</td>
</tr>
<tr>
<td>599</td>
<td>Tom Rutt</td>
<td>Fujitsu</td>
</tr>
<tr>
<td>600</td>
<td>Rich Salz</td>
<td>IBM</td>
</tr>
<tr>
<td>601</td>
<td>Shivajee Samdarshi</td>
<td>Tibco</td>
</tr>
<tr>
<td>602</td>
<td>Vladimir Videlov</td>
<td>SAP</td>
</tr>
<tr>
<td>603</td>
<td>Claus von Riegen</td>
<td>SAP</td>
</tr>
<tr>
<td>604</td>
<td>Pete Wenzel</td>
<td>Sun</td>
</tr>
<tr>
<td>605</td>
<td>Steve Winkler</td>
<td>SAP</td>
</tr>
<tr>
<td>606</td>
<td>Ümit Yalçinalp</td>
<td>SAP</td>
</tr>
<tr>
<td>607</td>
<td>Nobuyuki Yamamoto</td>
<td>Hitachi</td>
</tr>
</tbody>
</table>