Web Services Addressing 1.0 - SOAP Binding

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Abstract

Web Services Addressing provides transport-neutral mechanisms to address Web services and messages. Web Services Addressing 1.0 - SOAP Binding (this document) defines the binding of the abstract properties defined in Web Services Addressing 1.0 - Core to SOAP Messages.

Status of this Document

This section describes the status of this document at the time of its publication. Other documents may supersede this document. A list of current W3C publications and the latest revision of this technical report can be found in the W3C technical reports index at http://www.w3.org/TR/.

This is the Last Call Working Draft of the Web Services Addressing 1.0 - SOAP Binding specification for review by W3C members and other interested parties. It has been produced by the Web Services Addressing Working Group (WG), which is part of the W3C Web Services Activity.

If the feedback is positive, the Working Group plans to submit this specification for consideration as a W3C Candidate Recommendation. Comments on this document are invited and are to be sent to the public public-ws-addressing-comments@w3.org mailing list (public archive). Comments can be sent until **11 May 2005**.

A diff-marked version against the previous version of this document is available. For a detailed list of changes since the last publication of this document, please refer to appendix **B. Change Log** [p.14] . Issues about this document are documented in the Last Call issues list maintained by the Working Group.

Discussion of this document takes place on the public-ws-addressing@w3.org mailing list (public archive).

This document was produced under the 5 February 2004 W3C Patent Policy. The Working Group maintains a public list of patent disclosures relevant to this document; that page also includes instructions for disclosing [and excluding] a patent. An individual who has actual knowledge of a patent which the individual believes contains Essential Claim(s) with respect to this specification should disclose the information in accordance with section 6 of the W3C Patent Policy.

Publication as a Working Draft does not imply endorsement by the W3C Membership. This is a draft document and may be updated, replaced or obsoleted by other documents at any time. It is inappropriate to cite this document as other than work in progress.

Editorial note	
The Web Services Addressing Working Group has decided to use XML Schema, where appropriate, to describe constructs defined in this specification. Note that this restricts use of Web Services Addressing to XML 1.0.	

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1. Introduction

Web Services Addressing 1.0 - Core[*WS-Addressing-Core [p.12]*] defines a set of abstract properties and an XML Infoset [*XML Information Set [p.13]*] representation thereof to reference Web service endpoints and to facilitate end-to-end addressing of endpoints in messages. Web Services Addressing 1.0 - SOAP Binding (this document) defines the binding of the abstract properties defined in Web Services Addressing 1.0 - Core to SOAP Messages.

The following example illustrates the use of these mechanisms in a SOAP 1.2 message being sent from http://example.com/business/client1 to http://example.com/fabrikam/Purchasing:

Example 1-1. Use of message addressing properties in a SOAP 1.2 message.

```
(001) <S:Envelope xmlns:S="http://www.w3.org/2003/05/soap-envelope"
                  xmlns:wsa="http://www.w3.org/2005/03/addressing">
(002)    <S:Header>
(003)     <wsa:MessageID>
(004)       http://example.com/6B29FC40-CA47-1067-B31D-00DD010662DA
(005)     </wsa:MessageID>
(006)     <wsa:ReplyTo>
(007)       <wsa:Address>http://example.com/business/client1</wsa:Address>
(008)     </wsa:ReplyTo>
(009)     <wsa:To>http://example.com/fabrikam/Purchasing</wsa:To>
(010)     <wsa:Action>http://example.com/fabrikam/SubmitPO</wsa:Action>
(011)    </S:Header>
(012)    <S:Body>
(013)      ...
(014)    </S:Body>
(015) </S:Envelope>
```

Lines (002) to (011) represent the header of the SOAP message where the mechanisms defined in the specification are used. The body is represented by lines (012) to (014).

Lines (003) to (010) contain the message addressing properties serialized as SOAP header blocks. Specifically, lines (003) to (005) specify the identifier for this message and lines (006) to (008) specify the endpoint to which replies to this message should be sent as an Endpoint Reference. Line (009) specifies

the address URI of the ultimate receiver of this message. Line (010) specifies an Action IRI identifying expected semantics.

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 [*IETF RFC 2119 [p.12]*].

When describing abstract data models, this specification uses the notational convention used by XML Infoset [*XML Information Set [p.13]*]. Specifically, abstract property names always appear in square brackets (e.g., [some property]).

When describing concrete XML schemas [*XML Schema Structures [p.13]* , *XML Schema Datatypes [p.13]*], this specification uses the notational convention of WS-Security [*WS-Security [p.13]*]. Specifically, each member of an element's [children] or [attributes] property is described using an XPath-like notation (e.g., /x:MyHeader/x:SomeProperty/@value1). The use of {any} indicates the presence of an element wildcard (<xs:any/>). The use of @{any} indicates the presence of an attribute wildcard (<xs:anyAttribute/>).

1.2 Namespaces

This specification uses a number of namespace prefixes throughout; they are listed in Table 1-1 [p.4] . Note that the choice of any namespace prefix is arbitrary and not semantically significant (see [*XML Namespaces [p.12]*]).

Table 1-1. Prefixes and Namespaces used in this specification

Prefix	Namespace
S	http://www.w3.org/2003/05/soap-envelope
S11	http://schemas.xmlsoap.org/soap/envelope
wsa	http://www.w3.org/2005/03/addressing
wsaw	http://www.w3.org/2005/03/addressing/wsdl
xs	http://www.w3.org/2001/XMLSchema

WS-Addressing is defined in terms of the XML Information Set [*XML Information Set [p.13]*]. WS-Addressing is conformant to the SOAP 1.2 [*SOAP 1.2 Part 1: Messaging Framework [p.13]*] processing model and is also compatible with SOAP 1.1[*SOAP 1.1 [p.13]*] for backwards compatibility. WS-Addressing may be used with WSDL [*WSDL 2.0 [p.12]*] described services as described in Web Services Addressing 1.0 - WSDL Binding[*WS-Addressing-WSDL [p.12]*]. The examples in this specification use an XML 1.0 [*XML 1.0 [p.12]*] representation but this is not a requirement.

All information items defined by this specification are identified by the XML namespace URI [*XML Namespaces [p.12]*] "http://www.w3.org/2005/03/addressing". A normative XML Schema [*XML Schema Structures [p.13]* , *XML Schema Datatypes [p.13]*] document can be obtained by dereferencing the XML namespace URI.

2. SOAP 1.2 Addressing 1.0 Feature

This section defines the SOAP 1.2 Addressing 1.0 Feature.

2.1 Feature Name

The SOAP 1.2 Addressing 1.0 Feature is named using the following IRI:

- http://www.w3.org/2005/03/addressing/feature

2.2 Description

The SOAP 1.2 Addressing 1.0 Feature provides a SOAP-specific expression of the abstract message addressing properties defined by Web Services Addressing 1.0 - Core[*WS-Addressing-Core [p.12]*].

This feature may be used with any SOAP MEP. A binding that supports this feature MUST provide a means to transmit the properties listed above with a message and to reconstitute their values on receipt of a message.

2.3 Properties

The SOAP 1.2 Addressing 1.0 Feature defines the following properties:

http://www.w3.org/2005/03/addressing/feature/Destination

Corresponds to the abstract [destination] property.

http://www.w3.org/2005/03/addressing/feature/SourceEndpoint

Corresponds to the abstract [source endpoint] property.

http://www.w3.org/2005/03/addressing/feature/ReplyEndpoint

Corresponds to the abstract [reply endpoint] property.

http://www.w3.org/2005/03/addressing/feature/FaultEndpoint

Corresponds to the abstract [fault endpoint] property.

http://www.w3.org/2005/03/addressing/feature/MessageId

Corresponds to the abstract [message id] property.

http://www.w3.org/2005/03/addressing/feature/Relationship

Corresponds to the abstract [relationship] property.

http://www.w3.org/2005/03/addressing/feature/ReferenceParameters

Corresponds to the abstract [reference parameters] property.

http://www.w3.org/2005/03/addressing/feature/Action

Corresponds to the abstract [action] property.

2.4 Interactions with Other SOAP Features

If the http://www.w3.org/2003/05/soap/features/action/Action property of the SOAP Action feature*SOAP 1.2 Part 2: Adjuncts [p.13]* has a value, then the value of the http://www.w3.org/2005/03/addressing/feature/Action property of the SOAP 1.2 Addressing 1.0 feature MUST be identical to it.

3. SOAP 1.2 Addressing 1.0 Module

The SOAP 1.2 Addressing 1.0 Module defines a set of SOAP header blocks to support the SOAP 1.2 Addressing 1.0 Feature described in **2. SOAP 1.2 Addressing 1.0 Feature** [p.5] . To ensure interoperability with a broad range of devices, all conformant implementations that include support for SOAP 1.2 MUST support the SOAP 1.2 Addressing 1.0 Module.

3.1 Module Name

The SOAP 1.2 Addressing 1.0 Module is identified using the following IRI:

- http://www.w3.org/2005/03/addressing/module

3.2 Description

The SOAP 1.2 Addressing 1.0 Feature (see **2. SOAP 1.2 Addressing 1.0 Feature** [p.5]) defines a set of SOAP properties and their correspondence to the abstract message addressing properties defined by Web Services Addressing 1.0 - Core[*WS-Addressing-Core [p.12]*]. The SOAP 1.2 Addressing 1.0 Module uses the XML Infoset representation of the abstract message addressing properties defined in Web Services Addressing 1.0 - Core.

When sending a message each property is represented using the appropriate element information item as a SOAP header block. The resulting header blocks are targetted at the ultimate recipient in the SOAP message path (note that extensions to WS-Addressing could be written to specify different targetting). **3.3 Binding Message Addressing Properties** [p.7] describes additional processing required when binding message addressing properties to SOAP header blocks.

When receiving a message, the abstract properties are populated from their corresponding element information items in the message. Note that the message addressing properties gathered by an intermediary when receiving a SOAP message do not necessarily get replayed as MAPs when resending the message along the message path.

3.3 Binding Message Addressing Properties

When a message is be addressed to an endpoint, the values of the SOAP 1.2 Addressing 1.0 Feature properties are mapped to the message as SOAP header blocks with the following additional modifications:

- The value of the http://www.w3.org/2005/03/addressing/feature/ReferenceParameters property is added to the SOAP message header. The element information item of each [reference parameter] (including all of its [children], [attributes] and [in-scope namespaces]) is added as a SOAP header block in the new message.
- Each header block added as a result of the above rule is annotated with a wsa:isReferenceParameter attribute whose value is "true".
- Each property that is of type IRI MUST be serialized as an absolute IRI in the SOAP message.

The following example shows how the SOAP 1.2 Addressing 1.0 Module is used to construct a message addressed to the endpoint:

Example 3-1. Example endpoint reference.

```
<wsa:EndpointReference
     xmlns:wsa="http://www.w3.org/2005/03/addressing"
     xmlns:fabrikam="http://example.com/fabrikam"
     xmlns:wsdli="http://www.w3.org/2004/08/wsdl-instance"
     wsdli:wsdlLocation="http://example.com/fabrikam
       http://example.com/fabrikam/fabrikam.wsdl">
   <wsa:Address>http://example.com/fabrikam/acct</wsa:Address>
   <wsa:Metadata>
       <wsaw:InterfaceName>fabrikam:Inventory</wsaw:InterfaceName>
   <wsa:Metadata>
   <wsa:ReferenceParameters>
       <fabrikam:CustomerKey>123456789</fabrikam:CustomerKey>
       <fabrikam:ShoppingCart>ABCDEFG</fabrikam:ShoppingCart>
   </wsa:ReferenceParameters>
</wsa:EndpointReference>
```

The address value is copied in the "To" header block and the "CustomerKey" and "ShoppingCart" elements are copied literally as a header blocks in a SOAP message addressed to this endpoint. The resulting SOAP message would look as follows:

Example 3-2. Example endpoint reference mapped to SOAP message header blocks.

```
<S:Envelope xmlns:S="http://www.w3.org/2003/05/soap-envelope"
         xmlns:wsa="http://www.w3.org/2005/03/addressing"
         xmlns:fabrikam="http://example.com/fabrikam">
   <S:Header>
     ...
```

```
    <wsa:To>http://example.com/fabrikam/acct</wsa:To>
    <wsa:Action>...</wsa:Action>
    <fabrikam:CustomerKey wsa:isReferenceParameter='true'>123456789</fabrikam:CustomerKey>
    <fabrikam:ShoppingCart wsa:isReferenceParameter='true'>ABCDEFG</fabrikam:ShoppingCart>
     ...
   </S:Header>
   <S:Body>
     ...
   </S:Body>
</S:Envelope>
```

4. SOAP 1.1 Addressing 1.0 Extension

The SOAP 1.1 Addressing 1.0 Extension defines a set of SOAP header blocks to support the SOAP 1.2 Addressing 1.0 Feature described in **2. SOAP 1.2 Addressing 1.0 Feature** [p.5] . To ensure interoperability with a broad range of devices, all conformant implementations that include support for SOAP 1.1 MUST support the SOAP 1.1 Addressing 1.0 Extension. This SOAP 1.1 extension is provided for backwards compatibility only.

4.1 Extension Name

The SOAP 1.1 Addressing 1.0 Extension is identified using the following IRI:

- http://www.w3.org/2005/03/addressing/module

4.2 Description

The SOAP 1.2 Addressing 1.0 Feature (see **2. SOAP 1.2 Addressing 1.0 Feature** [p.5]) defines a set of SOAP properties and their correspondence to the abstract message addressing properties defined by Web Services Addressing 1.0 - Core[*WS-Addressing-Core [p.12]*]. The SOAP 1.1 Addressing 1.0 Extension uses the XML Infoset representation of the abstract message addressing properties defined in Web Services Addressing 1.0 - Core and binds each element information item to a SOAP header block. The SOAP 1.1 Addressing 1.0 Extension operates as described in **3. SOAP 1.2 Addressing 1.0 Module** [p.6] with the following exceptions:

SOAP Action

> Use of the SOAPAction HTTP header is required when using the SOAP 1.1 HTTP binding. The value of the SOAPAction HTTP header SHOULD be identical to the value of the http://www.w3.org/2005/03/addressing/feature/Action property of the Web Services Addressing 1.0 feature.

5. Faults

The faults defined in this section are generated if the condition stated in the preamble in each subsection is met.

Endpoints compliant with this specification MUST include the required message addressing properties serialized as SOAP headers in all fault messages. Fault messages are correlated as replies using the [relationship] property as defined in Section 3. The [action] property below designates WS-Addressing fault messages:

```
http://www.w3.org/2005/03/addressing/fault
```

The definitions of faults use the following properties:

[Code] The fault code.

[Subcode] The fault subcode.

[Reason] The English language reason element.

[Detail] The detail element. If absent, no detail element is defined for the fault.

The properties above bind to a SOAP 1.2 fault as follows:

Example 5-1. Binding of fault properties to SOAP 1.2 messages.

```
<S:Envelope>
 <S:Header>
   <wsa:Action>
     http://www.w3.org/2005/03/addressing/fault
   </wsa:Action>
   <!-- Headers elided for clarity.  -->
 </S:Header>
 <S:Body>
  <S:Fault>
   <S:Code>
    <S:Value>[Code]</S:Value>
     <S:Subcode>
    <S:Value>[Subcode]</S:Value>
     </S:Subcode>
   </S:Code>
   <S:Reason>
     <S:Text xml:lang="en">[Reason]</S:Text>
   </S:Reason>
   <S:Detail>
     [Detail]
  </S:Detail>
  </S:Fault>
 </S:Body>
</S:Envelope>
```

The SOAP 1.1 fault is less expressive and map only [Subcode] and [Reason]. These the properties bind to a SOAP 1.1 fault as follows:

Example 5-2. Binding of fault properties to SOAP 1.1 messages.

```
<S11:Envelope>
 <S11:Body>
  <S11:Fault>
   <faultcode>[Subcode]</faultcode>
   <faultstring xml:lang="en">[Reason]</faultstring>
  </S11:Fault>
 </S11:Body>
</S11:Envelope>
```

5.1 Invalid Message Addressing Property

A message information property cannot be processed.

[Code] S:Sender

[Subcode] wsa:InvalidMessageAddressingProperty

[Reason] A message addressing property is not valid and the message cannot be processed. The validity failure can be either structural or semantic, e.g. a [destination] that is not an IRI or a [relationship] to a [message id] that was never issued.

[Detail] [invalid property]

5.2 Message Addressing Property Required

A required message addressing property is absent.

[Code] S:Sender

[Subcode] wsa:MessageAddressingPropertyRequired

[Reason] A required message addressing property is not present.

[Detail] [Missing Property QName]

5.3 Destination Unreachable

No endpoint can be found capable of acting in the role of the [destination] property.

[Code] S:Sender

[Subcode] wsa:DestinationUnreachable

[Reason] No route can be determined to reach [destination].

[Detail] empty

5.4 Action Not Supported

The [action] property in the message is not supported at this endpoint.

The contents of this fault are as follows:

[Code] S:Sender

[Subcode] wsa:ActionNotSupported

[Reason] The [action] cannot be processed at the receiver.

[Detail] [action]

5.5 Endpoint Unavailable

The endpoint is unable to process the message at this time either due to some transient issue or a permanent failure.

The endpoint may optionally include a RetryAfter parameter in the detail. The source should not retransmit the message until this duration has passed.

[Code] S:Receiver

[Subcode] wsa:EndpointUnavailable

[Reason] The endpoint is unable to process the message at this time.

[Detail] <wsa:RetryAfter ...>[xs:NonNegativeInteger]</wsa:RetryAfter>

The following describes the attributes and elements listed above:

/wsa:RetryAfter

> This element (of type xs:nonNegativeInteger) is a suggested minimum duration in milliseconds to wait before retransmitting the message. If this element is omitted from the detail, the value is infinite.

Editorial note: M Hadley	
The WG seeks feedback on the choice of nonNegativeInteger for this element. Other types considered included unsignedLong, unsignedInt and duration.	

/wsa:RetryAfter/@{any}

> Optional extensibility attributes that do not affect processing.

6. Security Considerations

WS-Addressing message addressing properties serialized as SOAP headers (wsa:To, wsa:Action et al.) including those headers present as a result of the [reference parameters] property SHOULD be integrity protected as explained in Web Services Addressing 1.0 - Core[*WS-Addressing-Core [p.12]*].

When receiving a SOAP message, certain SOAP headers may be resulting from the serialization of an EPR's [reference parameters] property. The SOAP message receiver MAY perform additional security and sanity checks to prevent unintended actions.

6.1 Additional Considerations for SOAP Intermediaries

To avoid breaking signatures, intermediaries MUST NOT change the XML representation of WS-Addressing headers. Specifically, intermediaries MUST NOT remove XML content that explicitly indicates otherwise-implied content, and intermediaries MUST NOT insert XML content to make implied values explicit. For instance, if a RelationshipType attribute is present with a value of "http://www.w3.org/2005/03/addressing/reply", an intermediary MUST NOT remove it; similarly, if there is no RelationshipType attribute, an intermediary MUST NOT add one.

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A. Acknowledgements (Non-Normative)

This document is the work of the W3C Web Service Addressing Working Group.

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B. Change Log (Non-Normative)

B.1 Changes Since Second Working Draft

Date	Editor	Description
2005-03-21 @ 23:15	mgudgin	Added sentence about SOAP 1.1 to section 4
2005-03-18 @ 23:21	mgudgin	s/Addresssing/Addressing
2005-03-10 @ 03:40	mhadley	Incorporated additional editorial fixes from J. Marsh.
2005-03-10 @ 03:16	mhadley	Incorporated additional issue resolution text for issues 7 and 44 from H. Haas.
2005-03-10 @ 02:06	mhadley	Incorporated editorial fixes from J. Marsh.
2005-03-09 @ 07:11	mhadley	Fixed example that didn't reflect the chnage from wsa:Type to wsa:isReferenceParameter
2005-03-08 @ 20:50	mhadley	Added resolution to issue 53 (schema tweaks)
2005-03-02 @ 21:18	mhadley	Added resolution to issue 4
2005-03-02 @ 20:30	mhadley	Added resolution to issue 7
2005-03-02 @ 19:36	mhadley	Added resolution to issues 22 and 51/
2005-02-28 @ 22:08	mhadley	Added resolution to issues 24 and 26
2005-02-27 @ 19:42	mhadley	Changed URI to IRI where appropriate.
2005-02-17 @ 15:37	mhadley	Added issue 47 resolution
2005-02-15 @ 22:06	mhadley	Fixed some references to message information headers to message information properties

B.2 Changes Since First Working Draft

Date	Editor	Description
2005-02-01 @ 19:49	mhadley	Removed several occurances of the word 'identify' when used with endpoint references. Replaced with 'reference' or 'address' as appropriate.
2005-01-24 @ 20:22	mgudgin	Removed spurious reference to section 3.3.2 from Section 3
2005-01-23 @ 21:11	mgudgin	Incorporated resolution of issue i008; added wsa:Type attribute to reference parameters
2005-01-20 @ 13:10	mgudgin	Removed text from first paragraph of section 3 per resolution of issue i040
2005-01-16 @ 22:41	mgudgin	s/PortType/InterfaceName in certain examples
2004-12-16 @ 18:20	mhadley	Added resolution to issue 19 - WSDL version neutrality
2004-12-16 @ 16:50	mhadley	Added issue 33 resolution
2004-12-14 @ 20:10	mhadley	Switched back to edcopy formatting
2004-12-14 @ 20:02	mhadley	Enhanced auto-changelog generation to allow specification of data ranges for logs. Split change log to show changes between early draft and first working draft and changes since first working draft.
2004-12-14 @ 18:13	mhadley	Added resolutions for issues 12 (EPR lifecycle), 37 (relationship from QName to URI) and 39 (spec name versioning)

B.3 Changes Since Submission

Date	Editor	Description
2004-11-24 @ 15:32	mhadley	Added note that addressing is backwards compatible with SOAP 1.1
2004-11-23 @ 21:38	mhadley	Updated titles of examples. Fixed table formatting and references. Replaced uuid URIs with http URIs in examples. Added document status.
2004-11-07 @ 02:03	mhadley	Second more detailed run through to separate core, SOAP and WSDL document contents. Removed dependency on WS-Policy. Removed references to WS-Trust and WS-SecurityPolicy
2004-11-02 @ 22:25	mhadley	Removed static change log and added dynamically generated change log from cvs.
2004-10-28 @ 17:05	mhadley	Initial cut of separating specification into core, soap and wsdl