

# Web Services Policy Assertions Language (WS-PolicyAssertions)

Version 1.0

December 18, 2002

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## **Abstract**

This document specifies a set of common message policy assertions that can be specified within a policy.

## **Composable Architecture**

By using the XML, SOAP and WSDL extensibility models, the WS\* specifications are designed to be composed with each other to provide a rich Web services environment. WS-PolicyAssertions by itself does not provide a negotiation solution for Web services. WS-PolicyAssertions 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 WS-PolicyAssertions Specification is an initial public draft release and is provided for review and evaluation only. IBM and Microsoft hope to solicit your contributions and suggestions in the near future. IBM and Microsoft make no warranties or representations regarding the specifications in any manner whatsoever.

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## **1. Introduction**

This specification defines general messaging-related assertions for use with [WS-Policy](#).

### **1.1. Goals**

The goal of WS-PolicyAssertions is to provide basic assertions needed to enable Web Services applications.

## 1.2. Example

The following example illustrates a policy:

```
001 <wsp:Policy xmlns:x="..." >
002   <wsp:All>
003     <wsp:TextEncoding wsp:Usage="wsp:Required"
004       Encoding="iso-8859-5" />
005     <wsp:SpecVersion wsp:Usage="wsp:Required"
006       URI="http://schemas.xmlsoap.org/ws/2002/12/policy" />
007     <wsp:ExactlyOne>
008       <wsp:Language wsp:Usage="wsp:Required"
009         wsp:Preference="10" Language="da" />
010       <wsp:Language wsp:Usage="wsp:Required"
011         wsp:Preference="7" Language="en-gb" />
012       <wsp:Language wsp:Usage="wsp:Required"
013         wsp:Preference="1" Language="en" />
014     </wsp:ExactlyOne>
015   </wsp:All>
016 </wsp:Policy>
```

In this example, we illustrate the expression of general policies. Lines 3 and 4 represent a specific policy expression for text encoding.

Lines 5 and 6 illustrate the expression of a reference to a specification.

Lines 7-14 represent the `<ExactlyOne>` policy operator that is used to produce policy statements. That is, a valid policy can contain any of the contained assertions (line 3 to 4).

## 2. Notations and Terminology

This section specifies the notations, namespaces, and terminology used in this specification.

### 2.1. Notational Conventions

The keywords "MUST", "MUST NOT", "wsp:Required", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "wsp:Optional" in this document are to be interpreted as described in RFC2119.

Namespace URIs (of the general form "some-URI") represents some application-dependent or context-dependent URI as defined in RFC2396.

### 2.2. Namespaces

The XML namespace URI that MUST be used by implementations of this specification is:

<http://schemas.xmlsoap.org/ws/2002/12/policy>

The following namespaces are used in this document:

Prefix	Namespace
S	<a href="http://www.w3.org/2002/06/soap-envelope">http://www.w3.org/2002/06/soap-envelope</a>
xsd	<a href="http://www.w3.org/2001/XMLSchema">http://www.w3.org/2001/XMLSchema</a>
wsse	<a href="http://schemas.xmlsoap.org/ws/2002/07/secext">http://schemas.xmlsoap.org/ws/2002/07/secext</a>
wsp	<a href="http://schemas.xmlsoap.org/ws/2002/12/policy">http://schemas.xmlsoap.org/ws/2002/12/policy</a>
wsu	<a href="http://schemas.xmlsoap.org/ws/2002/07/utility">http://schemas.xmlsoap.org/ws/2002/07/utility</a>

## 2.3. Schema Files

The schema for this specification can be located at:

<http://schemas.xmlsoap.org/ws/2002/12/policy>

In this document reference is made to the *wsu:Id* attribute and the `<wsu:Created>` and `<wsu:Expires>` elements in a utility schema (<http://schemas.xmlsoap.org/ws/2002/07/utility>). The *wsu:Id* attribute and the `<wsu:Created>` and `<wsu:Expires>` elements were added to the utility schema with the intent that other specifications requiring such an ID or timestamp could reference it (as is done here).

## 2.4. Terminology

We introduce the following terms which are used throughout this document:

**Policy** – A *policy* is a set of domain-specific policy statements.

**Policy Statement** – A *policy statement* is a group of policy assertions.

**Policy Assertion** – A *policy assertion* represents an individual preference, requirement, capability or other property.

## 3. General Assertions

This section describes a set of policy assertions that MAY be used within policy expressions. Unless otherwise noted these assertions may be used by both the Web service and the client.

### 3.1. TextEncoding Assertion

A Web service may support more than one character set for encoding textual data (including XML 1.0). For example, *ISO-8859-1* or *ISO-8859-5* or *UTF-8*. In such cases, a mechanism is required to indicate which character encodings are supported. The `<TextEncoding>` element is used to indicate this.

This element uses syntax described in section 4.3.3 of XML 1.0 (the EncName production).

The schema outline for `<wsp:TextEncoding>` is as follows:

```
<wsp:TextEncoding Encoding="..." wsp:Usage="..." wsp:Preference="...">
  ...
</wsp:TextEncoding>
```

```
</wsp:TextEncoding>
```

The following describes the attributes and tags listed in the schema outlined above:

*/TextEncoding*

This indicates supported character sets.

*/TextEncoding/@Encoding*

The value is specified as defined in [section 4.3.3](#) of XML 1.0 Second Edition..

*/TextEncoding/@wsp:Usage*

This mandatory attribute indicates the usage of this assertion (e.g., required, optional, etc.) per [WS-Policy](#).

*/TextEncoding/@wsp:Preference*

This optional attribute specifies the preference of this particular alternative. The preference is expressed as an xsd:int. The higher the value of the preference, the greater the weighting of the expressed preference. If no preference is specified, a value of zero is assumed.

*/TextEncoding/{any}*

This is an extensibility mechanism to allow additional information to be specified.

*/TextEncoding/@{any}*

This is an extensibility mechanism to allow additional attributes to be specified.

The following example illustrates the use of this declaration:

```
<wsp:TextEncoding wsp:Usage="wsp:Required" Encoding="iso-8859-5"/>
```

## 3.2. Language Assertion

A Web service may allow alternative natural languages to be used in message content. Consequently, there is a need for Web services to express their supported and preferred languages. The `<wsp:Language>` element is used to do this.

Note that the scope of usage of the `<Language>` element corresponds to the `xml:lang` attribute defined in the XML 1.0 Second Edition specification. It is expected that additional specifications will address internationalization preferences and capabilities in a distributed system.

The schema outline for `<wsp:Language>` is as follows:

```
<wsp:Language wsp:Usage="..." wsp:Preference="..." Language="...">
  ...
</wsp:Language>
```

The following describes the attributes and tags listed in the schema outlined above:

*/Language*

This indicates supported languages.

*/Language/@Language*

The language value as specified in section 2.12 of XML 1.0 Second Edition.

#### */Language/@wsp:Usage*

This mandatory attribute indicates the usage of this assertion (e.g., required, optional, etc.) per [WS-Policy](#).

#### */Language/@wsp:Preference*

This optional attribute specifies the preference of this particular alternative. The preference is expressed as an xsd:int. The higher the value of the preference, the greater the weighting of the expressed preference. If no preference is specified, a value of zero is assumed.

#### */Language/{any}*

This is an extensibility mechanism to allow additional information to be specified.

#### */Language/@{any}*

This is an extensibility mechanism to allow additional attributes to be specified.

The following example illustrates the use of this declaration. This example indicates the policy prefers Danish, but will accept British English and other types of English

```
<wsp:ExactlyOne>
  <wsp:Language wsp:Usage="wsp:Required"
    wsp:Preference="10"
    Language="da" />
  <wsp:Language wsp:Usage="wsp:Required"
    wsp:Preference="7"
    Language="en-gb" />
  <wsp:Language wsp:Usage="wsp:Required"
    wsp:Preference="1"
    Language="en" />
</wsp:ExactlyOne>
```

### 3.3. SpecVersion Assertion

Over time different specifications are revised. As a result, Web services may support different versions of the same specification. In some cases the specifications will be backwardly compatible; in others they won't. As a result, Web services need a way to indicate which specifications, and which versions of those specifications, they support. The `<wsp:SpecVersion>` element is used to indicate this.

The schema outline for `<wsp:SpecVersion>` is as follows:

```
<wsp:SpecVersion wsp:Usage="...">
  URI="..."
  wsp:Preference="...">
</wsp:SpecVersion>
```

The following describes the attributes and tags listed in the schema outlined above:

### */SpecVersion*

This identifies a specific supported specification. There may be multiple specification elements if multiple versions of the specification are supported.

### */SpecVersion/@wsp:Usage*

This mandatory attribute indicates the usage of this assertion (e.g., required, optional, etc.) per [WS-Policy](#).

### */SpecVersion/@wsp:Preference*

This optional attribute specifies the preference of this particular alternative. The preference is expressed as an `xsd:int`. The higher the value of the preference, the greater the weighting of the expressed preference. If no preference is specified, a value of zero is assumed.

### */SpecVersion/@URI*

This is the URI of the specification; the URI SHOULD refer to a specific version of a specification using the specification URI designed by the organization creating the specification. For example: The WC3 SOAP/1.1 specification is identified by the URI "`http://www.w3.org/TR/2000/NOTE-SOAP-20000508/`". The June 2002 working draft of SOAP/1.2 is identified by the URI "`http://www.w3.org/TR/2002/WD-soap12-part1-20020626/`".

### */SpecVersion/{any}*

This is an extensibility mechanism to allow additional information to be specified.

### */SpecVersion/@{any}*

This is an extensibility mechanism to allow additional attributes to be specified.

The following example illustrates the use of this declaration:

```
<wsp:SpecVersion wsp:Usage="wsp:Required"
  URI="http://schemas.xmlsoap.org/ws/2002/12/policy"/>
```

In some cases, a specification has multiple parts and just specifying the version of the specification isn't enough. In such cases, the specification outlines the different classes of support as elements in its schema. These tags, as appropriate, can be specified within the `<SpecVersion>` element. The following example illustrates support for "part 1" of the "framtiz" specification whose schema is dated 12/2001.

```
<wsp:SpecVersion xmlns=".../utility" wsp:Usage="wsp:Required"
  URI="http://www.fabrikam123.com/2001/12/framitz">
  <f:part1 xmlns:f="..." />
</wsp:SpecVersion>
```

## **3.4. MessagePredicate Assertion**

In this section we provide a policy assertion that MAY be used to ensure that a message conforms to a given predicate (pre-condition). For example, some message parts may be optional per a specification, but required by a specific implementation. The `<wsp:MessagePredicate>` element is used to indicate this.

The schema outline for this element is as follows:

```

<wsp:MessagePredicate wsp:Usage="..." Dialect="...">
  ...
</wsp:MessagePredicate>

```

The following describes the attributes and elements listed in the schema outlined above:

**/MessagePredicate**

The contents of this element (of type `xsd:string`) specify a predicate expression that must evaluate to true for all conformant messages. The evaluation of the expression is determined by the optional dialect attribute. The default dialect is "<http://www.w3.org/TR/1999/REC-xpath-19991116>" indicating the expression is an XPath 1.0 expression. If there are multiple `<MessagePredicate>` elements specified, all must be true unless they are contained in a choice policy element (see *WS-Policy*). If the selection of the targets can be easily expressed using the "<http://schemas.xmlsoap.org/2002/12/wsse#part>" dialect, then it is RECOMMENDED. Otherwise it is RECOMMENDED that a general XPath expressions using the functions defined in Appendix I be used.

**/MessagePredicate/@wsp:Usage**

This mandatory attribute indicates the usage of this assertion (e.g., required, optional, etc.) per [WS-Policy](#).

**/MessagePredicate/@Dialect**

The optional attribute identifies the expression dialect in use as a URI. If the attribute is not present, then XPath 1.0 is assumed.

URI	Meaning
<a href="http://www.w3.org/TR/1999/REC-xpath-19991116">http://www.w3.org/TR/1999/REC-xpath-19991116</a> (Default)	The contents of the <code>&lt;MessagePredicate&gt;</code> element is an XPath 1.0 expression. The XPath expression is evaluated against the <code>S:Envelope</code> element node to determine a true or false result. The expression SHOULD use the functions defined in Appendix I (where appropriate).
<a href="http://schemas.xmlsoap.org/2002/12/wsse#part">http://schemas.xmlsoap.org/2002/12/wsse#part</a>	The contents of the <code>&lt;MessagePredicate&gt;</code> element is a list of required message parts that are identified using the set of pre-defined functions defined in Appendix II. The list of messages parts is evaluated against the <code>S:Envelope</code> element node to determine a true or false result; the expression is true if all the specified functions are non-empty.

**/MessagePredicate/@{any}**

This extensibility allows for additional attributes to be specified. The following example illustrates the use of this declaration. In this example, the messages to which this assertion applies must contain exactly one [WS-Security](#) <Security> header element.

```
<wsp:MessagePredicate wsp:Usage="wsp:Required">
    count(wsp:GetHeader(./wsse:Security) = 1
</wsp:MessagePredicate>
```

## 4. 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](#) or embedded within other objects using object-specific security mechanisms.

## 5. Acknowledgements

We would like to thank the following people for their contributions towards this specification:

- Debasish Banerjee, IBM
- Erik Christensen, Microsoft
- Francisco Curbera, IBM
- Giovanni Della-Libera, Microsoft
- Scott Konersmann, Microsoft
- Frank Leymann, IBM
- Steve Lucco, Microsoft
- Hiroshi Maruyama, IBM
- Steve Millet, Microsoft
- Henrik Frystyk Nielsen, Microsoft
- Keith Stobie, Microsoft
- Tony Storey, IBM
- Kent Tamura, IBM
- Sanjiva Weerawarana, IBM

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**Appendix I - XPath Expressions for Policies**

This section defines a set of normative functions for use with XPath to simplify the path expressions that may be used within assertions to reference message elements.

We define the *evaluation context* for the XPath expressions to be the document containing the SOAP envelope. The namespaces in use at the point of the assertion element containing the XPath expression automatically defined for the context of the XPath expression. We do not define any variables, but we do define the functions (which work across both SOAP 1.1 and SOAP 1.2) described below.

wsp:GetBody (node)	This function returns the SOAP envelope <Body> element from the specified Envelope element.
wsp:IsInBody (node)	This function returns true if the specified node is in the SOAP envelope <Body> element from the specified Envelope element.
wsp:GetHeader (node)	This function returns the SOAP envelop <Header> element from the specified

	Envelope element.
wsp:IsInHeader (node)	This function returns true if the specified node is in the SOAP envelop <Header> element from the specified Envelope element.
wsp:RoleURIForHeaderBlock (node)	This function returns the SOAP role for the specified header block.
wsp:IsMandatoryHeaderBlock (node)	This function returns true/false depending on whether or not the specified header block is mandatory ( <i>mustUnderstand</i> = true).
wsp:IsRoleURIForNext (node, string)	This function returns true/false depending on whether or not the specified role maps to the predefined "next" role for the version of SOAP used by the supplied message.
wsp:IsRoleURIForUltimateReceiver (node, string)	This function returns true/false depending on whether or not the specified role maps to the predefined "ultimate receiver" for the version of SOAP used by the supplied message.
wsp:GetNodesetForNode (node)	This function returns an XPath Node set for the node (this include the node, its attributes, all of its descendents and their attributes).

## Appendix II – Message Part Selection Functions

This section defines a set of functions that are used with the "http://schemas.xmlsoap.org/2002/12/wsse#part" dialect for selecting parts of a message:

wsp:Body()	This function identifies the "body" of the message.
wsp:Header(x)	This function identifies a "header" whose name is the specified QName.