

[MS-WSTEP]: WS-Trust X.509v3 Token Enrollment Extensions

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Revision Summary

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Contents

1 Introduction	6
1.1 Glossary	6
1.2 References	7
1.2.1 Normative References	7
1.2.2 Informative References	8
1.3 Overview	8
1.4 Relationship to Other Protocols	10
1.5 Prerequisites/Preconditions	11
1.6 Applicability Statement	11
1.7 Versioning and Capability Negotiation	11
1.8 Vendor-Extensible Fields	11
1.9 Standards Assignments	11
2 Messages	12
2.1 Transport	12
2.2 Common Message Syntax	12
2.2.1 Namespaces	12
2.2.2 Messages	12
2.2.3 Elements	12
2.2.4 Complex Types	12
2.2.5 Simple Types	12
2.2.6 Attributes	13
2.2.7 Groups	13
2.2.8 Attribute Groups	13
3 Protocol Details	14
3.1 SecurityTokenService Server Details	14
3.1.1 Abstract Data Model	15
3.1.1.1 Authentication	15
3.1.1.1.1 Kerberos Authentication	15
3.1.1.1.2 X.509v3 Certificate Authentication	15
3.1.1.1.3 Username and Password Authentication	15
3.1.1.1.4 No (Anonymous) Authentication	15
3.1.2 Timers	15
3.1.3 Initialization	15
3.1.4 Message Processing Events and Sequencing Rules	16
3.1.4.1 wst:RequestSecurityToken2	16
3.1.4.1.1 Messages	16
3.1.4.1.1.1 wst:RequestSecurityTokenMsg	16
3.1.4.1.1.2 wst:RequestSecurityTokenResponseCollectionMsg	16
3.1.4.1.2 Elements	17
3.1.4.1.2.1 wstep:CertificateEnrollmentWSDetail	17
3.1.4.1.2.2 DispositionMessage	17
3.1.4.1.2.3 wst:KeyExchangeToken	17
3.1.4.1.2.4 RequestID	17
3.1.4.1.2.5 wst:RequestSecurityToken	17
3.1.4.1.2.6 RequestSecurityTokenResponseCollection	17
3.1.4.1.2.7 wst:RequestType	18
3.1.4.1.2.8 wst:TokenType	18
3.1.4.1.3 Complex Types	18

3.1.4.1.3.1	DispositionMessageType	18
3.1.4.1.3.2	wst:RequestedSecurityTokenType	18
3.1.4.1.3.3	wst:RequestSecurityTokenType	19
3.1.4.1.3.4	wst:RequestSecurityTokenResponseType.....	21
3.1.4.1.3.5	wst:RequestSecurityTokenResponseCollectionType	22
3.1.4.1.3.6	wst:RequestTypeEnum	23
3.1.4.1.3.7	wstep:CertificateEnrollmentWSDetailType.....	23
3.1.4.1.4	Attributes.....	23
3.1.4.2	Processing Rules.....	24
3.1.4.2.1	WSTEP Action: Request Security Token Processing Rules	24
3.1.4.2.1.1	New and Renewal Request Processing	24
3.1.4.2.1.2	QueryTokenStatus Request Processing	25
3.1.4.2.2	KET Action: Request Security Token Processing Rules.....	25
3.1.4.2.2.1	Key Exchange Token Request Processing.....	25
3.1.5	Timer Events	25
3.1.6	Other Local Events	26
4	Protocol Examples.....	27
4.1	RequestSecurityToken Request/Response Message Sequence.....	27
4.1.1	Standard Certificate Request	27
4.1.1.1	RequestSecurityToken Message (Issue Request).....	27
4.1.1.2	Server RequestSecurityToken Response	28
4.1.2	Key Exchange Token Request	30
4.1.2.1	Client Exchange Token Request.....	30
4.1.2.2	Server Key Exchange Token Response	31
4.1.3	Retrieval of a previously pended certificate request with Query Token Status.....	32
4.1.3.1	Client Request.....	32
4.1.4	Message exchange with a server fault.....	33
4.1.4.1	Client Request.....	33
4.1.4.2	Server Fault Response.....	33
4.1.5	Certificate Renewal.....	33
4.1.5.1	Client Renewal Request	33
4.1.5.2	Server Request Security Token Response	36
5	Security.....	39
5.1	Security Considerations for Implementers.....	39
5.2	Index of Security Parameters	39
6	Appendix A: Full WSDL.....	40
7	Appendix B: Product Behavior.....	41
8	Change Tracking.....	42
9	Index	43

1 Introduction

The WS-Trust X.509v3 Token Enrollment Protocol Extensions are extensions of WS-Trust that are used by a system to request that a **certificate** be issued.

The communication is initiated by a requesting client who requests a new certificate, retrieval of an issued certificate, or retrieval of a server certificate. The server processes the request and generates a response based on the request type.

Sections 1.8, 2, and 3 of this specification are normative and can contain the terms MAY, SHOULD, MUST, MUST NOT, and SHOULD NOT as defined in RFC 2119. Sections 1.5 and 1.9 are also normative but cannot contain those terms. All other sections and examples in this specification are informative.

1.1 Glossary

The following terms are defined in [\[MS-GLOS\]](#):

- Abstract Syntax Notation One (ASN.1)**
- certificate**
- certification authority (CA)**
- globally unique identifier (GUID)**
- Hypertext Transfer Protocol over Secure Sockets Layer (HTTPS)**
- Public Key Cryptography Standards (PKCS)**
- SOAP action**
- SOAP body**
- SOAP fault**
- SOAP fault code**
- SOAP fault detail**
- SOAP header**
- SOAP header block**
- SOAP message**
- SOAP mustUnderstand attribute**
- Unicode**
- Uniform Resource Locator (URL)**
- Web Services Description Language (WSDL)**
- WSDL message**
- WSDL port type**
- WSDL operation**
- X.509**
- XML**
- XML namespace**
- XML schema (XSD)**

The following terms are specific to this document:

Certificate Management Messages over CMS (CMC): An internet standard for transport mechanisms for CMS [\[RFC2797\]](#).

Cryptographic Message Syntax (CMS): An internet standard for cryptographically protected messages [\[RFC3852\]](#).

Security Token Service (STS): A special type of server defined in WS-Trust [\[WSTrust1.3\]](#).

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as described in [\[RFC2119\]](#). All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

References to Microsoft Open Specifications documentation do not include a publishing year because links are to the latest version of the documents, which are updated frequently. References to other documents include a publishing year when one is available.

A reference marked "(Archived)" means that the reference document was either retired and is no longer being maintained or was replaced with a new document that provides current implementation details. We archive our documents online [\[Windows Protocol\]](#).

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information.

[MS-WCCE] Microsoft Corporation, "[Windows Client Certificate Enrollment Protocol](#)".

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.rfc-editor.org/rfc/rfc2119.txt>

[RFC2797] Myers, M., Liu, X., Schaad, J., and Weinstein, J., "Certificate Management Messages Over CMS", RFC 2797, April 2000, <http://www.ietf.org/rfc/rfc2797.txt>

[RFC2986] Nystrom, M., and Kaliski, B., "PKCS#10: Certificate Request Syntax Specification", RFC 2986, November 2000, <http://www.ietf.org/rfc/rfc2986.txt>

[RFC3066] Alvestrand, H., "Tags for the Identification of Language", RFC 3066, January 2001, <http://www.ietf.org/rfc/rfc3066.txt>

[RFC3852] Housley, R., "Cryptographic Message Syntax (CMS)", RFC 3852, July 2004, <http://www.ietf.org/rfc/rfc3852.txt>

[RFC5246] Dierks, T., and Rescorla, E., "The Transport Layer Security (TLS) Protocol Version 1.2", RFC 5246, August 2008, <http://www.ietf.org/rfc/rfc5246.txt>

[WSDL] Christensen, E., Curbera, F., Meredith, G., and Weerawarana, S., "Web Services Description Language (WSDL) 1.1", W3C Note, March 2001, <http://www.w3.org/TR/2001/NOTE-wsdl-20010315>

[WSS] OASIS, "Web Services Security: SOAP Message Security 1.1 (WS-Security 2004)", February 2006, <http://www.oasis-open.org/committees/download.php/16790/wss-v1.1-spec-os-SOAPMessageSecurity.pdf>

[WSSUTP] OASIS Standard, "Web Services Security UsernameToken Profile 1.0", March 2004, <http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-username-token-profile-1.0.pdf>

[WSTrust1.3] Lawrence, K., Kaler, C., Nadalin, A., et al., "WS-Trust 1.3", March 2007, <http://docs.oasis-open.org/ws-sx/ws-trust/200512/ws-trust-1.3-os.html>

[WSTrust1.3Schema] OASIS Standard, "WS-Trust 1.3", <http://docs.oasis-open.org/ws-sx/ws-trust/200512/ws-trust-1.3.xsd>

[XMLNS] Bray, T., Hollander, D., Layman, A., et al., Eds., "Namespaces in XML 1.0 (Third Edition)", W3C Recommendation, December 2009, <http://www.w3.org/TR/2009/REC-xml-names-20091208/>

[XMLSCHEMA1] Thompson, H.S., Beech, D., Maloney, M., and Mendelsohn, N., Eds., "XML Schema Part 1: Structures", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/>

[XMLSCHEMA2] Biron, P.V., and Malhotra, A., Eds., "XML Schema Part 2: Datatypes", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-2-20010502/>

1.2.2 Informative References

[MS-GLOS] Microsoft Corporation, "[Windows Protocols Master Glossary](#)".

[SCEP] Nourse, A., and Vilhuber, J. Ed., "Cisco Systems' Simple Certificate Enrollment Protocol", April 2009, <http://tools.ietf.org/html/draft-nourse-scep-19>

1.3 Overview

The WS-Trust X.509v3 Token Enrollment Extensions (WSTEP) defines the token enrollment profile for WS-Trust [\[WSTrust1.3\]](#) to allow a client to request **X.509v3** certificates.

Existing **certificate authorities** support **ASN.1** formats such as PKCS#10 ([\[RFC2986\]](#)), PKCS#7 ([\[RFC3852\]](#)), or CMC ([\[RFC2797\]](#)) to encode a certificate request, and those requests are carried in an existing protocol, such as Windows Client Certificate Enrollment Protocol [\[MS-WCCE\]](#) or Cisco's SCEP ([\[SCEP\]](#)). WSTEP also carries those requests from the client to the issuer.

WSTEP provides for issuance, renewal, and delayed-issuance scenarios for X.509v3 digital certificates. The server is known in WS-Trust [\[WSTrust1.3\]](#) terminology as a **Security Token Service (STS)**.

The WS-Trust protocol [\[WSTrust1.3\]](#) definition provides the framework for the STS and for enrollment profile extensions. A typical client interacts with a STS with a request security token (RST) message. The STS responds to a client request security token message with a request security token response (RSTR) or a **SOAP fault**.

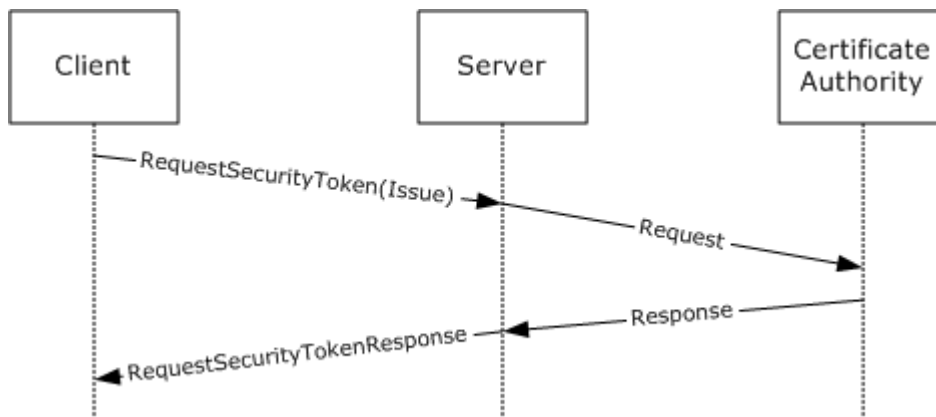


Figure 1: Typical sequence for certificate enrollment

The following figure shows a scenario in which a request cannot be satisfied immediately. In this scenario, the client makes a request, and the server reply indicates that the request is pending some other action. The client then queries the request at a later time, presumably after any

conditions for its satisfaction have been met, and receives a reply that the request was issued, rejected, or is still pending.

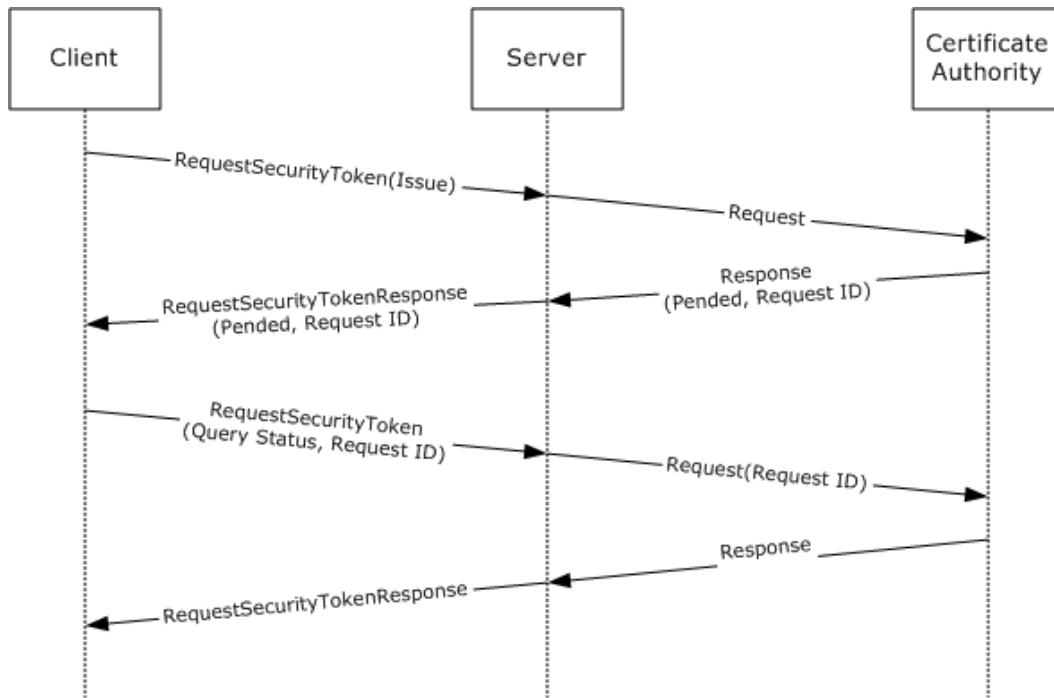


Figure 2: Typical sequence for a pended certificate enrollment request

In some circumstances, the client request may be rejected. In these instances, the STS responds with a SOAP fault. The following figure shows the typical sequence.

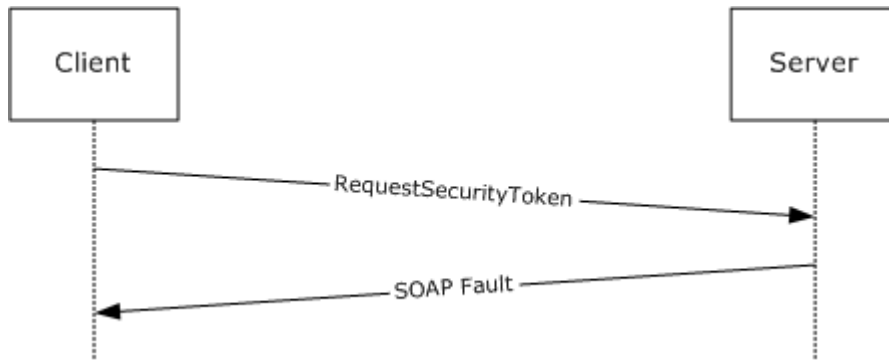


Figure 3: Typical sequence for a rejected certificate renewal request

The following figure is an example of a message exchange for a renewal request. A renewal request uses an existing certificate and requests a new lifespan. From the point of view of the WSTEP protocol, this is the same as an issue request, as the message format is unchanged.

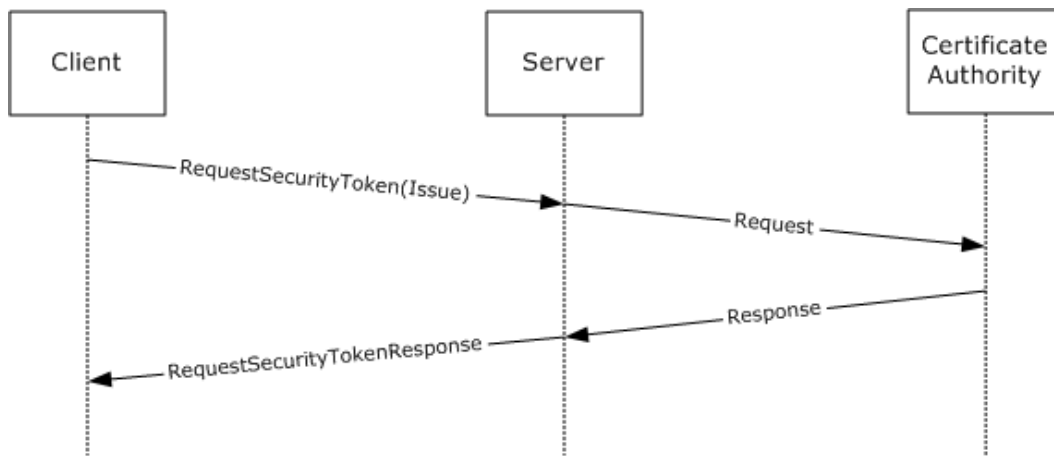


Figure 4: Typical sequence for a certificate renewal request

1.4 Relationship to Other Protocols

The following figure shows the WSTEP Protocol stack diagram.

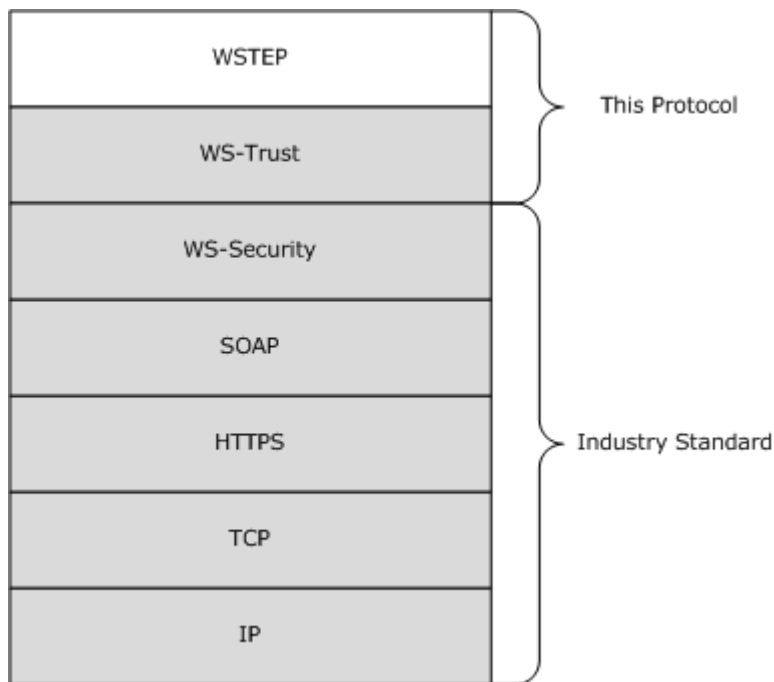


Figure 5: WSTEP Protocol stack diagram

The WSTEP protocol specification is a profile of the WS-Trust Protocol [\[WSTrust1.3\]](#) and makes use of the SOAP and **Hypertext Transfer Protocol over Secure Sockets Layer (HTTPS)** protocols for messaging and security.

1.5 Prerequisites/Preconditions

The WSTEP protocol specification facilitates the issuance of X.509v3 certificates. A server implementation of the protocol requires the functionality of a certificate authority, capable of interpreting requests in at least one of PKCS#7, PKCS#10, or **Certificate Management Messages over CMS (CMC)**.

1.6 Applicability Statement

The WSTEP protocol specification is applicable only for requests for X.509v3 certificates.

1.7 Versioning and Capability Negotiation

The WSTEP protocol specification does not include versioning and capability negotiation.

1.8 Vendor-Extensible Fields

The WSTEP protocol specification does not include any vendor-extensible fields. WSTEP adheres to the WS-Trust 1.3 [\[WSTrust1.3\]](#) provided extension points.

1.9 Standards Assignments

None.

2 Messages

2.1 Transport

SOAP version 1.2 MUST be used for messaging for the WSTEP protocol. HTTPS protocol MUST be used as the transport.

2.2 Common Message Syntax

This section contains common definitions used by this protocol. The syntax of the definitions uses the **XML schema** as defined in [\[XMLSCHEMA1\]](#) and [\[XMLSCHEMA2\]](#), and the **Web Services Description Language** as defined in [\[WSDL\]](#).

2.2.1 Namespaces

This specification defines and references various **XML namespaces**, using the mechanisms specified in [\[XMLNS\]](#). Although this specification associates a specific **XML namespace** prefix for each XML namespace that is used, the choice of any particular XML namespace prefix is implementation-specific and not significant for interoperability.

Prefixes and XML namespaces used in this specification are as follows.

Prefix	Namespace URI	Reference
xs	http://www.w3.org/2001/XMLSchema	[XMLSCHEMA1]
wst	http://docs.oasis-open.org/ws-sx/ws-trust/200512	[WSTrust1.3]
auth	http://schemas.xmlsoap.org/ws/2006/12/authorization	[XMLSCHEMA1]
wsu	http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-utility-1.0.xsd	
wsse	http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-secext-1.0.xsd	
wstep	http://schemas.microsoft.com/windows/pki/2009/01/enrollment	MS-WSTEP

2.2.2 Messages

None.

2.2.3 Elements

This specification does not define any common XML schema element definitions.

2.2.4 Complex Types

This specification does not define any common XML schema complex type definitions.

2.2.5 Simple Types

The WSTEP protocol specification does not define any common XML schema simple type definitions.

2.2.6 Attributes

The WSTEP protocol specification does not define any common XML schema attribute definitions.

2.2.7 Groups

The WSTEP protocol specification does not define any common XML schema group definitions.

2.2.8 Attribute Groups

The WSTEP protocol specification does not define any common XML schema attribute group definitions.

3 Protocol Details

The client side of this protocol is a simple pass-through. No additional timers or other state is required on the client side of this protocol. Calls made by the higher-layer protocol or application are passed directly to the transport layer, and the results returned by the transport are passed directly back to the higher-layer protocol or application.

This section addresses the message processing model for the protocol. It includes related information required by an implementation to successfully send and consume protocol messages.

3.1 SecurityTokenService Server Details

The **SecurityTokenService** hosts a message endpoint that receives **RequestSecurityToken** messages. When received, the server processes the client request and sends it to the certificate authority. Upon receiving a response from the certificate authority, a response is generated, and the server sends either a **RequestSecurityTokenResponse** message or a SOAP fault. When the message has been sent to the client, the server returns to the waiting state.

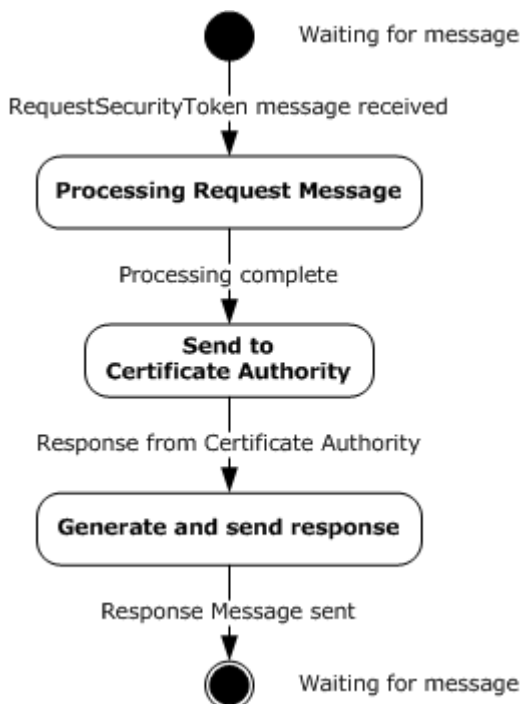


Figure 6: Security token service state model

The items of information that are communicated between the server and the certificate authority are specified in this section, but the method of communication used, including timeout and error handling (local API, local remote procedure call (RPC), or some other protocol) is not specified.

The certificate authority MAY have additional requirements that MUST be met in order to issue an X509v3 Certificate, such as manager approval, payment processing, or validation of request information. In these instances, a certificate authority response indicating the issuance is pending.

3.1.1 Abstract Data Model

A server supporting the WSTEP protocol maintains a relationship to an issuer which processes messages submitted by the server. When communicating with requestors, a server can support a variety of languages.

Issuer: An address of a certificate authority (CA). The format of the stored address is specific to the implementation and to the form of communication used between the Issuer and the Server.

SupportedLanguages: A list of language identifiers supported by the server. The set of languages are of type `xml:lang` and defined in [\[RFC3066\]](#).

DefaultLanguage: The default language for the server. `DefaultLanguage` is of type `xml:lang`, and the set of supported languages is defined in [\[RFC3066\]](#).

3.1.1.1 Authentication

The WS-Trust X509v3 Enrollment Extensions use the authentication provisions in WS-Security ([\[WSS\]](#)) for the X509v3 Security Token issuer to authenticate the X509v3 Security Token requestor. This section defines the schema used to express the credential descriptor for each supported credential type.

3.1.1.1.1 Kerberos Authentication

Authentication using Kerberos is done at the transport layer.

3.1.1.1.2 X.509v3 Certificate Authentication

Authentication using X509v3 certificates is done at the transport level using Transport Level Security (TLS) 1.2 as defined in [\[RFC5246\]](#).

3.1.1.1.3 Username and Password Authentication

The username and password credential is provided in a request message using the WS-Security Username Token Profile 1.0. The username is provided as defined in section 3.1 of the Ws-Security document [\[WSSUTP\]](#).

3.1.1.1.4 No (Anonymous) Authentication

If no authentication is provided at either the transport layer or the message layer, the request is considered to be anonymous. Anonymous authentication is supported only for renewal requests, where the signature from the existing certificate on the request object serves as authentication for the X509v3 Security Token requestor.

3.1.2 Timers

None.

3.1.3 Initialization

The *SupportedLanguages* object MUST be initialized with the set of languages that the server supports.

The *DefaultLanguage* parameter MUST be initialized with the language that is to be used by the server when a request does not define a language preference, or the preference is not in *SupportedLanguages*.<1>

3.1.4 Message Processing Events and Sequencing Rules

Operation	Description
wst:RequestSecurityToken2	The wst:RequestSecurityToken2 operation is the sole operation in the WSTEP protocol. It provides the mechanism for certificate enrollment requests, retrieval of pending certificate status, and the request of the server key exchange certificate. The wst:RequestSecurityToken2 operation is defined in WS-Trust 1.3 [WSTrust1.3] .

3.1.4.1 wst:RequestSecurityToken2

The wst:RequestSecurityToken2 operation provides the mechanism for certificate enrollment requests, retrieval of pending certificate status, and the request of the server key exchange certificate. The wst:SecurityTokenService port and wst:RequestSecurityToken2 operation are defined in the [\[WSTrust1.3\]](#) WSDL wsdl:portType definition.

```
<wsdl:operation name="RequestSecurityToken2">
  <wsdl:input message="wst:RequestSecurityTokenMsg" />
  <wsdl:output message="wst:RequestSecurityTokenResponseCollectionMsg" />
</wsdl:operation>
```

WSTEP makes use of the wst:RequestSecurityToken2 operation. The wst:RequestSecurityToken operation defined in the SecurityTokenService operation is not used. The wst:RequestSecurityTokenMsg message consists of a single object definition: the client request. The client request is made using the acceptable SOAP actions as defined in section [3.1.4.2](#) and RequestType values, as defined in section [3.1.4.1.2.7](#).

3.1.4.1.1 Messages

The following WSDL message definitions are specific to this operation.

3.1.4.1.1.1 wst:RequestSecurityTokenMsg

The wst:RequestSecurityTokenMsg is an incoming message, and is defined in WS-Trust 1.3 [\[WSTrust1.3\]](#) WSDL.

wst:RequestSecurityToken: An instance of a **wst:RequestSecurityTokenType** complex type as defined in section [3.1.4.1.3.3](#). The **wst:RequestSecurityToken** element defines the client request and the required information for it to be processed.

3.1.4.1.1.2 wst:RequestSecurityTokenResponseCollectionMsg

The wst:RequestSecurityTokenResponseCollectionMsg is an outgoing message, and is defined in WS-Trust 1.3 [\[WSTrust1.3\]](#) WSDL.

wst:RequestSecurityTokenResponseCollectionMsg: An instance of a **wst:RequestSecurityTokenResponseCollection** element as defined in section [3.1.4.1.2.6](#). This element contains the results of the client request.

3.1.4.1.2 Elements

3.1.4.1.2.1 wstep:CertificateEnrollmentWSDetail

The **wstep:CertificateEnrollmentWSDetail** element is used to convey additional information to a client as part of the SOAP fault structure when a server returns a SOAP fault.

```
<xs:element name="CertificateEnrollmentWSDetail" nillable="true"
type="wstep:CertificateEnrollmentWSDetailType" />
```

wstep:CertificateEnrollmentWSDetail: An instance of a `<wstep:CertificateEnrollmentWSDetailType>` as defined in section [3.1.4.1.3.7](#). If there is no additional information, the **wstep:CertificateEnrollmentWSDetail** SHOULD be omitted in the SOAP fault.

3.1.4.1.2.2 DispositionMessage

```
<xs:element name="DispositionMessage"
type="wstep:DispositionMessageType" nillable="true" />
```

DispositionMessage: An instance of a `DispositionMessageType` object as defined in section [3.1.4.1.3.1](#).

3.1.4.1.2.3 wst:KeyExchangeToken

The `<wst:KeyExchangeToken>` element is defined in WS-Trust 1.3 [\[WSTrust1.3\]](#) section 8.4.

wst:KeyExchangeToken: The `wst:KeyExchangeToken` element provides a key exchange token that can be used in certificate enrollment requests that include the private key.

3.1.4.1.2.4 RequestID

```
<xs:element name="RequestID"
type="xs:string" nillable="true"/>
```

RequestID: A string identifier used to identify a request.

3.1.4.1.2.5 wst:RequestSecurityToken

The `<wst:RequestSecurityToken>` element is defined in WS-Trust 1.3 [\[WSTrust1.3\]](#), section 3.1.

wst:RequestSecurityToken: An instance of a **wst:RequestSecurityTokenType** object as specified in section [3.1.4.1.3.3](#).

3.1.4.1.2.6 RequestSecurityTokenResponseCollection

The `RequestSecurityTokenResponseCollection` is defined in WS-Trust 1.3 [\[WSTrust1.3\]](#), section 3.2.

RequestSecurityTokenResponseCollection: An instance of a **wst:RequestSecurityTokenResponseCollectionType** object as specified in section [3.1.4.1.3.5](#).

3.1.4.1.2.7 wst:RequestType

The <wst:RequestType> element is defined in [\[WSTrust1.3\]](#) section 3.1.

wst:RequestType: An instance of a <wst:RequestTypeOpenEnum> object as defined in [\[WSTrust1.3\]](#) XML schema definition(XSD).

The <wst:RequestType> MUST have one of the following values:

```
"http://docs.oasis-open.org/ws-sx/ws-trust/200512/Issue"  
"http://schemas.microsoft.com/windows/pki/2009/01/enrollment/QueryTokenStatus"  
"http://docs.oasis-open.org/ws-sx/ws-trust/200512/KET"
```

If the <wst:RequestType> has any other value, the server MUST respond with a SOAP fault.

3.1.4.1.2.8 wst:TokenType

The <TokenType> element is defined in [\[WSTrust1.3\]](#), section 3.1.

wst:TokenType: For the X.509 enrollment extension to WS-Trust, the <wst:tokentype> element MUST be <http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-x509-token-profile-1.0#X509v3>.

3.1.4.1.3 Complex Types

The following XML schema complex type definitions are specific to this operation.

3.1.4.1.3.1 DispositionMessageType

The DispositionMessageType is an extension to the string type that allows an attribute definition of the language for the string. The DispositionMessageType is used to provide additional information about the server processing.

```
<xs:complexType name="DispositionMessageType">  
  <xs:simpleContent>  
    <xs:extension base="xs:string">  
      <xs:attribute ref="xml:lang" use="optional" />  
    </xs:extension>  
  </xs:simpleContent>  
</xs:complexType>
```

xs:string: The string element contains the literal string disposition message returned from the server. The string element contains an xml:lang attribute that defines the language for the string. The language SHOULD be provided for each string element instance.

xml:lang: The language reference xml:lang, indicating the natural or formal language the string element content is written in.

3.1.4.1.3.2 wst:RequestedSecurityTokenType

The wst:RequestedSecurityTokenType is defined in WS-Trust XML schema definition (XSD) [\[WSTrust1.3Schema\]](#).

```

<xs:complexType name="RequestedSecurityTokenType">
  <xs:sequence>
    <xs:any namespace="##any" processContents="lax" />
  </xs:sequence>
</xs:complexType>

```

The WSTEP extends wst: RequestedSecurityTokenType with two additional elements.

```

<xs:element ref="wsse:BinarySecurityToken" />
<xs:element ref="wsse:SecurityTokenReference" />

```

wsse:BinarySecurityToken: The wsse:BinarySecurityToken element contains the issued certificate. The issued certificate follows the encoding and data structure defined in [\[MS-WCCE\]](#) section 2.2.2.8.

wsse:SecurityTokenReference: A URI reference used to indicate where a pending Certificate Request can be retrieved. The server MUST provide its own URI as the value of the <wsse:BinarySecurityTokenReference:Reference> element as specified in [\[WSTrust1.3\]](#) section 4.2.

3.1.4.1.3.3 wst:RequestSecurityTokenType

The **wst:RequestSecurityTokenType** complex type contains the elements for the security token request in the RequestSecurityTokenMsg message. It is the client-provided object for a certificate enrollment request. **wst:RequestSecurityTokenType** is defined in the WS-Trust [\[WSTrust1.3\]](#) XML schema definition (XSD).

```

<xs:complexType name="RequestSecurityTokenType">
  <xs:annotation>
    <xs:documentation>
      Actual content model is non-deterministic, hence wildcard. The following shows intended
      content model:
      <xs:element ref='wst:TokenType' minOccurs='0' />
      <xs:element ref='wst:RequestType' />
      <xs:element ref='wsp:AppliesTo' minOccurs='0' />
      <xs:element ref='wst:Claims' minOccurs='0' />
      <xs:element ref='wst:Entropy' minOccurs='0' />
      <xs:element ref='wst:Lifetime' minOccurs='0' />
      <xs:element ref='wst:AllowPostdating' minOccurs='0' />
      <xs:element ref='wst:Renewing' minOccurs='0' />
      <xs:element ref='wst:OnBehalfOf' minOccurs='0' />
      <xs:element ref='wst:Issuer' minOccurs='0' />
      <xs:element ref='wst:AuthenticationType' minOccurs='0' />
      <xs:element ref='wst:KeyType' minOccurs='0' />
      <xs:element ref='wst:KeySize' minOccurs='0' />
      <xs:element ref='wst:SignatureAlgorithm' minOccurs='0' />
      <xs:element ref='wst:Encryption' minOccurs='0' />
      <xs:element ref='wst:EncryptionAlgorithm' minOccurs='0' />
      <xs:element ref='wst:CanonicalizationAlgorithm' minOccurs='0' />
      <xs:element ref='wst:ProofEncryption' minOccurs='0' />
      <xs:element ref='wst:UseKey' minOccurs='0' />
      <xs:element ref='wst:SignWith' minOccurs='0' />
      <xs:element ref='wst:EncryptWith' minOccurs='0' />
      <xs:element ref='wst:DelegateTo' minOccurs='0' />
      <xs:element ref='wst:Forwardable' minOccurs='0' />
    </xs:documentation>
  </xs:annotation>
</xs:complexType>

```

```

    <xs:element ref='wst:Delegatable' minOccurs='0' />
    <xs:element ref='wsp:Policy' minOccurs='0' />
    <xs:element ref='wsp:PolicyReference' minOccurs='0' />
    <xs:any namespace='##other' processContents='lax' minOccurs='0' maxOccurs='unbounded'
  />
</xs:documentation>
</xs:annotation>
<xs:sequence>
  <xs:any namespace="##any" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
</xs:sequence>
<xs:attribute name="Context" type="xs:anyURI" use="optional" />
<xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>

```

WSTEP extends <wst:RequestSecurityTokenType> with the following elements:

```

<xs:element ref="wsse:BinarySecurityToken" minOccurs="0"
maxOccurs="1" />
<xs:element ref="auth:AdditionalContext" minOccurs="0"
maxOccurs="1" />
<xs:element ref="wstep:RequestKET" minOccurs="0" maxOccurs="1"
<xs:element ref="wstep:RequestID" minOccurs="0" maxOccurs="1" />

```

Only the elements specified below are used in WSTEP. Any element received that is not specified below SHOULD be ignored.

wst:TokenType: Refers to the wst:TokenType definition in section [3.1.4.1.2.8](#).

wst:RequestType: Refers to the wst:RequestType definition in section [3.1.4.1.2.7](#). The wst:RequestType is used to identify the type of the security token request.

wst:RequestKET: Used when requesting a key exchange token as defined in [\[WSTrust1.3\]](#) section 8.4.

wsse:BinarySecurityToken: Provides the DER ASN.1 representation of the certificate request. The type of token is defined by the wst:TokenType element. For the X.509 enrollment extension the wst:TokenType MUST be specified as in section [3.1.4.1.2.8](#). The certificate request follows the formatting from [\[MS-WCCE\]](#) section 2.2.2.6. The EncodingType attribute of the wsse:BinarySecurityToken element MUST be set to base64Binary.

auth:AdditionalContext: The auth:AdditionalContext element is used to provide extra information in a wst:RequestSecurityToken message. It is an optional element, and SHOULD be omitted if there is no extra information to be passed.

wstep:RequestID: An instance of **wstep:RequestID** as specified in section [3.1.4.1.2.4](#).

WSTEP extends <wst:RequestSecurityTokenType> with an additional attribute:

```

<xs:attribute name="PreferredLanguage" type="xs:language"
use="optional" />

```

Only the attribute specified below is used in WSTEP. Any attribute received that is not specified below SHOULD be ignored.

wstep:PreferredLanguage: The **wstep:PreferredLanguage** attribute defines the preferred language to be used in a server response.

3.1.4.1.3.4 wst:RequestSecurityTokenResponseType

The wst:RequestSecurityTokenResponseType contains the elements that are part of a server response to a wst:RequestSecurityToken message. wst:RequestSecurityTokenResponseType is defined in the WS-Trust [\[WSTrust1.3\]](#) XML schema definition (XSD).

```
<xs:complexType name="RequestSecurityTokenResponseType">
  <xs:annotation>
    <xs:documentation>
      Actual content model is non-deterministic, hence wildcard. The following shows intended
      content model:
      <xs:element ref='wst:TokenType' minOccurs='0' />
      <xs:element ref='wst:RequestType' />
      <xs:element ref='wst:RequestedSecurityToken' minOccurs='0' />
      <xs:element ref='wsp:AppliesTo' minOccurs='0' />
      <xs:element ref='wst:RequestedAttachedReference' minOccurs='0' />
      <xs:element ref='wst:RequestedUnattachedReference' minOccurs='0' />
      <xs:element ref='wst:RequestedProofToken' minOccurs='0' />
      <xs:element ref='wst:Entropy' minOccurs='0' />
      <xs:element ref='wst:Lifetime' minOccurs='0' />
      <xs:element ref='wst:Status' minOccurs='0' />
      <xs:element ref='wst:AllowPostdating' minOccurs='0' />
      <xs:element ref='wst:Renewing' minOccurs='0' />
      <xs:element ref='wst:OnBehalfOf' minOccurs='0' />
      <xs:element ref='wst:Issuer' minOccurs='0' />
      <xs:element ref='wst:AuthenticationType' minOccurs='0' />
      <xs:element ref='wst:Authenticator' minOccurs='0' />
      <xs:element ref='wst:KeyType' minOccurs='0' />
      <xs:element ref='wst:KeySize' minOccurs='0' />
      <xs:element ref='wst:SignatureAlgorithm' minOccurs='0' />
      <xs:element ref='wst:Encryption' minOccurs='0' />
      <xs:element ref='wst:EncryptionAlgorithm' minOccurs='0' />
      <xs:element ref='wst:CanonicalizationAlgorithm' minOccurs='0' />
      <xs:element ref='wst:ProofEncryption' minOccurs='0' />
      <xs:element ref='wst:UseKey' minOccurs='0' />
      <xs:element ref='wst:SignWith' minOccurs='0' />
      <xs:element ref='wst:EncryptWith' minOccurs='0' />
      <xs:element ref='wst:DelegateTo' minOccurs='0' />
      <xs:element ref='wst:Forwardable' minOccurs='0' />
      <xs:element ref='wst:Delegatable' minOccurs='0' />
      <xs:element ref='wsp:Policy' minOccurs='0' />
      <xs:element ref='wsp:PolicyReference' minOccurs='0' />
      <xs:any namespace='##other' processContents='lax' minOccurs='0' maxOccurs='unbounded'
    />
  </xs:documentation>
</xs:annotation>
  <xs:sequence>
    <xs:any namespace="##any" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
  <xs:attribute name="Context" type="xs:anyURI" use="optional" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
```

WSTEP extends the wst:RequestSecurityTokenResponseType with the following elements:

```

    <xs:element ref="wstep:DispositionMessage" />
    <xs:element ref="wsse:BinarySecurityToken" minOccurs="0" maxOccurs="1" />
    <xs:element ref="wstep:RequestID" minOccurs="0" maxOccurs="1"
  <xs:element ref="wst:KeyExchangeToken" minOccurs="0" maxOccurs="1" />
  />

```

Only the elements documented as follows are used by WSTEP. Any element received that is not documented as follows SHOULD be ignored.

wst:TokenType: Refers to the TokenType definition in section [3.1.4.1.2.8](#).

wstep:DispositionMessage: Refers to the definition in section [3.1.4.1.2.2](#). The wstep:DispositionMessage element is used to convey any additional server disposition information as part of the response message.

wsse:BinarySecurityToken: Refers to the wsse:BinarySecurityToken definition in section [3.1.4.1.3.2](#).

wst: KeyExchangeToken: Refers to the wst:KeyExchangeToken definition in section [3.1.4.1.2.3](#).

wst:RequestedSecurityToken: An instance of a wst:RequestedSecurityTokenType object as defined in section [3.1.4.1.3.2](#).

wstep:RequestID: An instance of a **wstep:RequestID** as defined in section [3.1.4.1.2.4](#) that conveys the request identifier of the originating request.

3.1.4.1.3.5 wst:RequestSecurityTokenResponseCollectionType

The <wst:RequestSecurityTokenResponseCollectionType> is defined in the [\[WSTrust1.3\]](#) XML schema definition (XSD) as a collection of one or more <wst:RequestSecurityTokenResponse> elements. The WS-Trust X.509v3 Token Enrollment Extensions further constrain the [\[WSTrust1.3\]](#) definition and the <wst:RequestSecurityTokenResponseCollection> collection MUST contain at most one <wst:RequestSecurityTokenResponse> element.

```

<xs:complexType name="RequestSecurityTokenResponseCollectionType">
  <xs:annotation>
    <xs:documentation>
      The <wst:RequestSecurityTokenResponseCollection> element (RSTRC) MUST be used to return a
      security token or response to a security token request on the final
      response.</xs:documentation>
    </xs:annotation>
    <xs:sequence>
      <xs:element ref="wst:RequestSecurityTokenResponse" minOccurs="1" maxOccurs="unbounded" />
    </xs:sequence>
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>

```

wst:RequestSecurityTokenResponse: An instance of a [wst:RequestSecurityTokenResponseType](#) object. The <wst:RequestSecurityTokenResponseCollectionType> MUST contain only one <RequestSecurityTokenResponse> element.

3.1.4.1.3.6 wst:RequestTypeEnum

The <wst:RequestTypeEnum> is defined in WS-Trust [\[WSTrust1.3\]](#) XML schema definition (XSD). WSTEP defines the following values for <wst:RequestTypeEnum>.

```
"http://schemas.microsoft.com/windows/pki/2009/01/enrollment/QueryTokenStatus"
```

WSTEP makes use of the Key Exchange Token request type defined in [\[WSTrust1.3\]](#) section 10:

```
"http://docs.oasis-open.org/ws-sx/ws-trust/200512/KET"
```

and the issue request type defined in [\[WSTrust1.3\]](#) XML Schema Definition (XSD)] :

```
"http://docs.oasis-open.org/ws-sx/ws-trust/200512/Issue"
```

3.1.4.1.3.7 wstep:CertificateEnrollmentWSDetailType

The <wstep:CertificateEnrollmentWSDetailType> contains additional information pertaining to error conditions.

```
<xs:complexType name="CertificateEnrollmentWSDetailType">
  <xs:sequence>
    <xs:element minOccurs="0" maxOccurs="1" name="BinaryResponse" nillable="true"
type="xs:string" />
    <xs:element minOccurs="0" maxOccurs="1" name="ErrorCode" nillable="true" type="xs:int"
/>
    <xs:element minOccurs="0" maxOccurs="1" name="InvalidRequest" nillable="true"
type="xs:boolean" />
    <xs:element minOccurs="0" maxOccurs="1" name="RequestID" type="xs:string"
nillable="true" />
  </xs:sequence>
</xs:complexType>
```

wstep:BinaryResponse: The wstep:BinaryResponse element is used to provide a response if the Issuer generates one. If there is no response to provide, the wstep:BinaryResponse element MUST be nil.

wstep:ErrorCode: An integer value representing a server error. If there is no error to provide, wstep:ErrorCode MUST be specified as nil.

wstep:InvalidRequest: If the request is denied by the Issuer the server MUST return true. For other errors the wstep:InvalidRequest SHOULD be false.

wstep:RequestID: If the Issuer provides a wstep:RequestID to the server, it MUST be provided to a client. If no wstep:RequestID is provided by the Issuer, the wstep:RequestID element should be specified as nil.

3.1.4.1.4 Attributes

There are no attributes that are specific to this operation.

3.1.4.2 Processing Rules

An incoming **SOAP message** MUST be processed to evaluate the **SOAP actions** and authentication information.

If the user is authenticated successfully using the provided authentication information, message processing MUST continue, and the authentication information SHOULD be provided to the Issuer. If the authentication fails, the server MUST respond with a SOAP fault.

If the SOAP action is "http://schemas.microsoft.com/windows/pki/2009/01/enrollment/RST/wstep" the server must follow the Request Security Token Processing Rules per section [3.1.4.2.1](#).

If the SOAP action is "http://docs.oasis-open.org/ws-sx/ws-trust/200512/RST/KET" the server must follow the Key Exchange Token Processing Rules per section [3.1.4.2.2](#).

If any other SOAP action is defined, the server SHOULD respond with a SOAP fault.

3.1.4.2.1 WSTEP Action: Request Security Token Processing Rules

A <wst:RequestSecurityTokenMsg> MUST contain a <wst:RequestType> element as defined in section [3.1.4.1.2.7](#). If the <wst:RequestType> element is absent, nil, or undefined, the server MUST respond with a SOAP fault.

If a **wstep:PreferredLanguage** attribute is not present in a <RequestSecurityTokenType> object, or the value is not in SupportedLanguages, the server SHOULD use DefaultLanguage.

If the <wst:RequestType> is "http://docs.oasis-open.org/ws-sx/ws-trust/200512/Issue", the server MUST process the request per section [3.1.4.2.1.1](#).

If the <wst:RequestType> is "http://schemas.microsoft.com/windows/pki/2009/01/enrollment/QueryTokenStatus" the server MUST process the request per section [3.1.4.2.1.2](#).

If the <wst:RequestType> is any other value, the server MUST respond with a SOAP fault.

3.1.4.2.1.1 New and Renewal Request Processing

A wst:RequestSecurityToken message with a wst:RequestType value of "http://docs.oasis-open.org/ws-sx/ws-trust/200512/Issue" is used for the purposes of issuing an X.509v3 certificate or for renewal of an existing X.509v3 certificate.

For this type of message, a server has additional syntax constraints on the request message.

wsse:BinarySecurityToken: If the wsse:BinarySecurityToken element is absent or undefined, the server MUST respond with a SOAP fault.

wstep:RequestID: If the **wstep:RequestID** element is present and defined, the server SHOULD ignore it.

The server MUST provide the **wsse:BinarySecurityToken** to the Issuer and SHOULD provide the **auth:AdditionalContext** (see section [3.1.4.1.3.3](#)) to the Issuer.

If the Issuer responds with an error, the server MUST respond with a SOAP fault. If the Issuer indicates the issuance is pending, the server MUST use the Issuer response to generate a pending **wst:RequestSecurityTokenResponseCollectionMsg** message. If the Issuer responds with an issued certificate, the server MUST respond with a **wst:RequestSecurityTokenResponseCollectionMsg** message providing the issued certificate.

3.1.4.2.1.2 QueryTokenStatus Request Processing

A **wst:RequestSecurityToken** message with a <wst:RequestType> of "http://schemas.microsoft.com/windows/pki/2009/01/enrollment/QueryTokenStatus" is used to retrieve an issued certificate or check the status of a certificate request that was pending.

For this type of message, the server has additional syntax constraints on the request message.

The **wstep:RequestID** element is a null-terminated **Unicode** string that contains a certificate request identifier (as defined in section [3.1.4.1.2.4](#)). If the <wstep:RequestID> element is absent, defined as nil, or contains no value the server MUST return a SOAP fault.

The server MUST provide the **wstep:RequestID** to the Issuer.

If the Issuer responds with an error, the server MUST respond with a SOAP fault. If the Issuer indicates the issuance is pending, the server MUST use the Issuer response to generate a pending **wst:RequestSecurityTokenResponseCollectionMsg** message. If the Issuer responds with an issued certificate, the server MUST respond with a **wst:RequestSecurityTokenResponseCollectionMsg** message providing the issued certificate.

3.1.4.2.2 KET Action: Request Security Token Processing Rules

A **wst:RequestSecurityTokenMsg** MUST contain a <wst:RequestType> element as defined in section [3.1.4.1.2.7](#). If the <wst:RequestType> element is absent, nil, or undefined, the server MUST respond with a SOAP fault.

If the <wst:RequestType> is "http://docs.oasis-open.org/ws-sx/ws-trust/200512/KET" the server MUST process the request per section [3.1.4.2.2.1](#).

If the <wst:RequestType> is any other value, the server MUST respond with a SOAP fault.

3.1.4.2.2.1 Key Exchange Token Request Processing

A RequestSecurityToken message of wst:RequestType of "http://docs.oasis-open.org/ws-sx/ws-trust/200512/KET" is used to retrieve the Key Exchange Token.

For this type of message, a server has additional syntax constraints on the **wst:RequestSecurityTokenMsg** message.

If the <wst:RequestKET> element is absent, the server MUST return a SOAP fault.

The server requests the Key Exchange Token from the issuer. If the issuer responds with an error, the server MUST respond with a SOAP fault. Otherwise, the server uses the Issuer response to generate a **wst:RequestSecurityTokenResponseCollectionMsg** message.

The <wst:RequestSecurityTokenResponse> element in the server response follows the [\[WSTrust1.3\]](#) definition in section 8, but for key exchange in the WSTEP protocol, the <wst:KeyExchangeToken> element MUST be present, and provides the key exchange token provided from the Issuer.

3.1.5 Timer Events

None.

3.1.6 Other Local Events

None.

4 Protocol Examples

4.1 RequestSecurityToken Request/Response Message Sequence

In the following message sequence, the username/password authentication headers have been included in the message sequences for clarity.

4.1.1 Standard Certificate Request

4.1.1.1 RequestSecurityToken Message (Issue Request)

```
<s:Envelope xmlns:a="http://www.w3.org/2005/08/addressing"
xmlns:s="http://www.w3.org/2003/05/soap-envelope">
  <s:Header>
    <a:Action s:mustUnderstand="1">
http://schemas.microsoft.com/windows/pki/2009/01/enrollment/RST/wstep</a:Action>
    <a:MessageID>urn:uuid:b5d1a601-5091-4a7d-b34b-5204c18b5919</a:MessageID>
    <a:ReplyTo>
    <a:Address>http://www.w3.org/2005/08/addressing/anonymous</a:Address>
    </a:ReplyTo>
  </s:Header>
  <s:Body xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
    <RequestSecurityToken xmlns="http://docs.oasis-open.org/ws-sx/ws-trust/200512">
    <TokenType>http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-x509-token-profile-
1.0#X509v3</TokenType>
    <RequestType>http://docs.oasis-open.org/ws-sx/ws-trust/200512/Issue</RequestType>
    <BinarySecurityToken EncodingType="http://docs.oasis-open.org/wss/2004/01/
oasis-200401-wss-wssecurity-secext-1.0.xsd#base64binary"
ValueType="http://docs.oasis-open.org/wss/2004/01/
oasis-200401-wss-wssecurity-secext-1.0.xsd#PKCS7"
xmlns="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-secext-
1.0.xsd">MIIEDDCCAvQCAQAwADCCASiDQYJKoZIhvcNAQEBBQADggEPADCCAQoCggEBANpk
/1AOEvYikbMjvabzpakYJkqLnaXWm2FvnO6UNctXWf9WchbbumLqkIas9BUcMiSE
Eh4tVZNfugi3bahnjUjTG9MIvAZd3/C0YfuLX8y19mcIVWZhyYZVwUeMh4GYS5ht
90NFZP0vXb7c0brSRyvhwWzq+kG7om24qMTZBgSIRsajcDVY+uGLdhixy4AtXNw5
pzzRdS/1QBF1wsDT3C0bceWy2uej2hsLYoLyGdd0fHkly/tOusoyjc3itw2o3P9j
k+bP4eDG2ukrjMMcjqxQ500Bze7hXQf2hrNEJRTd6pPIOdAub8Hz/DiPYaEY75XN
EQepc11nLmq2GQ9YghcCAWEAAaCCAcUwGgYKKwYBBAGCNw0CAzEMFgo2LjEuNzA1
My4yMGQCSsGAQQBgjcVFDFXMFUCAUMLzktMTM1MUMwNDA1QS5kOS0xMzUxQzA0
MDZBLm50dGVzdC5taWVyb3NvZnQuY29tDBJEOS0xMzUxQzA0MDZBXXGFiYnkMC0N1
c1Rlc3QuZlMhMHQGCisGAQQBgjcNAgIxZjBkAgEBHlwATQBpAGMAcGvBvAHMAbWBM
AHQAIAABFAG4AaABhAG4AYwBlAGQAIABDAlAeQBWAHQABWbnAHIAIYQBWAgAAQBJ
ACAAUABYAG8AdgBpAGQAZQByACAAdgAxAc4AMAMBADCBYgYJKoZIhvcNAQkOMYG8
MIG5MBCGCSsGAQQBgjcUAQKHHggAVQBzAGUAcjApBgNVHSUEIjAgBgorBgEEAYI3
DQMEBggrBgEFBQcDBAYIKwYBBQUHAWIwDgYDVR0PAQH/BAQDAgWgMEQGCSqGSIB3
DQEJdWQ3MDUwDgYIKoZIhvcNAwICAgCAMA4GCCqGSIB3DQMEAgIAgDAHBGUrDgMC
BzAKBgqgqhkiG9w0DBzAdBgNVHQ4EFgQUavblZB2QWQ6vt+ag4T4jZMPFe3owDQYJ
KoZIhvcNAQEFBQADggEBAGId8Dv9gvCVNgnSHkNuTiErtwIacv609MnMt2WxhnAj
zGQZzS4bZ9JNH+CR49yswieFCS3zFiP5PxGL5CCogn2XHGS7LCCzHtrltAZBACTC
tzLF5Qcj0Ki/H5GRa4Q+ZelUrcM1cSnD52zY+V1vFXX1Xc2P5hTB0bq8GbZME/MW
84XE1sz75NqZeQ2vhO66ozAMywMtC26Q+7DofBaPMxXrWgMQBm6qO/Yjj3vDY/U8
T9rpJqGHHTG7E7E+/3EcqPeKNExxf0n+VXRwL09C5wOS6Xy/JNGfuiPW+SzaRbPs
H5/6UiS+uqtSVzaJmA0a9vzxJQfgARCucr49wM3YUek=</BinarySecurityToken>
    <RequestID xsi:nil="true"
xmlns="http://schemas.microsoft.com/windows/pki/2009/01/enrollment" />
  </RequestSecurityToken>
</s:Body>
</s:Envelope>
```

4.1.1.2 Server RequestSecurityToken Response

```
<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
xmlns:a="http://www.w3.org/2005/08/addressing">
  <s:Header>
    <a:Action s:mustUnderstand="1">
http://schemas.microsoft.com/windows/pki/2009/01/enrollment/RSTRC/wstep</a:Action>
    <ActivityId CorrelationId="a0f231a3-ccf2-4b9c-99a6-bc353a59b5d0"
xmlns="http://schemas.microsoft.com/2004/09/ServiceModel/Diagnostics">
95427c83-902c-48db-9529-f61cc1d8c035</ActivityId>
    <a:RelatesTo>urn:uuid:b5d1a601-5091-4a7d-b34b-5204c18b5919</a:RelatesTo>
  </s:Header>
  <s:Body>
    <RequestSecurityTokenResponseCollection
xmlns="http://docs.oasis-open.org/ws-sx/ws-trust/200512">
      <RequestSecurityTokenResponse>
        <TokenType>http://docs.oasis-open.org/wss/2004/01/
oasis-200401-wss-x509-token-profile-1.0#X509v3</TokenType>
        <DispositionMessage xml:lang="en-US"
xmlns="http://schemas.microsoft.com/windows/pki/2009/01/enrollment">
Issued</DispositionMessage>
        <BinarySecurityToken
ValueType="http://docs.oasis-open.org/wss/2004/01/
oasis-200401-wss-wssecurity-secext-1.0.xsd#PKCS7"
EncodingType="http://docs.oasis-open.org/wss/2004/01/
oasis-200401-wss-wssecurity-secext-1.0.xsd#base64binary"
xmlns="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-secext-
1.0.xsd">MIIRLAYJKoZIHvcNAQcCoIIRhTCCEYECAQMcZaJBGUrDgMCGgUAMH0GCCSGAQUF
BwwDoHEEbzbTmGcwIQIBAqYIKwYBBQUHbWExEjAQAQEAMAMCAQEMBKlzc3VlZDBC
AgECBgorBgEAYI3CgoBMTEwLwIBADADAgEBMSUwIwYJKwYBBAGCNxURMRYEFFis
145+YbEalzsaa0G63KkQD6+OMAAwAKCCD0EwggNbMIICQ6ADAgECAhAeqF9153Dz
n0o0G27H8w6RMAOGCSqGSib3DQEBBQUAMDQxGzAZBgNVBASteKlpY3Jvc29mdCBQ
S0kgVGVhbTEVMBMGA1UEAwMRkJfFRW50Um9vdENBMB4XDTA5MDMwMzAzMjQxMl0x
DTE0MDMwMzAzMzQxMFoNDEBMBkGA1UECxMSTWljam9zb2Z0IFBLSzBUZWFtMRUw
EwYDVQDDAxGQ19FbnRSb290Q0EwggEiMAOGCSqGSib3DQEBAQUAA4IBDwAwggEK
AoIBAQCInE154odlKuJpZ8BoaqVISuE4BX9dXTsK0BmBVblPlYzI1RwMONE1Zr40
TdgZ/Nv69kwCOzi0D0Eo58fHYz3FAh6r4w+ABpx9nFJlJj69D9H7JlQWsdT0e
nQxwW59vzotQfMz00T//lNCilX3aBMj6VjArX51fYLCqBr2Qgw9BmEkaivntw9Vd
1gvJTPNoyG79c2V2Mux+4M9dzIR17xw8Mx4LhJrXXKQPZlYgwVwWdAXelS5aeoXG
LI2GIx15LtsUQzYxcelsVotVcfr4NM3lXkis5x679DtxMoB2gyqjUhkB1hTLIQwK
8V5v5jjsuy7tXP5qIEpOq7B6NCzAgMBAAGjATBnMBMGCSsGAQQBgjcuAQAQAQAQAQ
QwBMA4GAlUdDWEB/wQEAWIBhjAPBgNVHRMBAf8EBTADAQH/MB0GAlUdDgQWBBS9
oNbJuw92VLUQSIj1DzDz3dVTAQBgkkrBgEEAYI3FQEAAwIBADANBgkqhkiG9w0B
AQUFAAOCAQEAvr8MMHZHcnUUyKGFNBE8qNPKIHI9oDEee3jncHqO9wmKbEzV4701
+ejdiDjic9FqlHHbuWxhKpJOnAtqXN48E9XLPzS/ezx/LwsEv5LlroiorBm8NbA
1dLJNFqskrc0FAhefg9Jc4c91Q3uyGUjMb4Hoa9b2cqNIeMerzV+L1oH0wVzpg9o
i8OoCIfX/woETKBryiLnXPLybdQu0E7brTkyYmXJsGuFPGLzj6DVFOdb1ZMmEJNy
6Opr98dFJYwcnhjdVx0FtRTsXnU8epeAYOEHWjCuU0lbWpcRPF6C6sJY0wmRaP7
iOCOGXhoFO61cbL08fztvGpUkyZfDoHg3DCCBUwwggQoAMCAQICcmEMfNwAAAA
AAIwDQYJKoZIhvcNAQEFBQAwNDEBMBkGA1UECxMSTWljam9zb2Z0IFBLSzBUZWFtMRUw
EwYDVQDDAxGQ19FbnRSb290Q0EwHhcNMjMzNzZ0MDMwMzAzMDMyNjE2WhcNMTEwMzAz
MDMzNjE2WhcNMTEwMzAzMDMzNjE2WhcNMTEwMzAzMDMzNjE2WhcNMTEwMzAzMDMzNjE2Whc
C0ZCX0VudFN1YkNBMIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKAAQEAzqt1
8VMe3t1durXs81ORjWBWoxDQtTPJAlYNQdqvs+H2HutrUNjvW/+vK0Am0ib8GR3u
D8IT+Kk8TjvzSGouQAKXyTzaqjDt7Alc7UtsnelSiKDT5ZsflpmfUvASKd28jJ4Y
B1SDJSiJmOyWqUZCnwwAwW0VXCrMk1QnyGjr3Akq+p6Mgo/ZqaeFuj4o7jJjI/em
```

BN5mM0lX0y0jQF79bQbJagd0bidQkfSASDW3HAycTcWuKfMfjF5vPMZqLWcaRjAS
v2tEn9urPDJv4mhXrTz53ETuplkAomA95BQULnLXXHreXImUkGacdPhd1hCWm9KE
v1Q1vsks9UUBfHUCkWiDAQABO4ICXzCCA1swEAYJKwYBBAGCNxUBBAMCAQAwHQYD
VR00BBYEFJ+3jZGC0QUd0DHiPfaXeoF15VzIMBkGCSsGAQQBgjcUAgQMhGoAUwB1
AGIAQwBBMA4GA1UdDwEB/wQEAWIBhJAPBgNVHRMBAf8EBTADAQH/MB8GA1UdIwQY
MBAaFL2glsm5bP3a8u5BIgmUPNqaDd1VMIHsBgNVHR8EgeQwgeEwgD6ggduggdiG
gdVsZGFwO18vL0NOPUZCX0VudFJvb3RDQSxDtj05LTEzNTFDMDQwNkEsQ049Q0RQ
LENOPVB1YmXpYyYMETleSUyMfN1cnZpY2VzLENOPVN1cnZpY2VzLENOPUNvbmZp
Z3VyYXRpb24sREM9ZDktMTMlMUMwNDA2QSxEQz1udHRlc3QsREM9bWljcm9zb2Z0
LERDPWNvbT9jZXJ0aWZpY2F0ZVJlcm9jYXRpb25MaXN0P2Jhc2U/b2JqZWN0Q2xh
c3M9Y1JMRGlzdHJpYnV0aW9uUG9pbmQwgdGCSsGAQUFBwEBBIIHOMIHLMIHIBggr
BgEFBQcwAoBu2xkYXA6Ly8vQ049RkJfRW50Um9vdENBLENOPUFJQSxDtj1QdWJs
aWMLMjBLZXklMjBTZXJ2aWNlcYXDTj1TZXJ2aWNlcYXDTj1Db25maWd1cmF0aW9u
LERDPWQ5LTEzNTFDMDQwNkEsREM9bnR0ZXN0LERDPWlpY3Jvc29mdCxEQz1jb20/
Y0FDZXJ0aWZpY2F0ZT9iYXNlP29iamVjdENsYXNzPWNlcjRzZmljYXRpb25BdXR0
b3JpdHkwDQYJKoZIhvcNAQEFBQADggEBACUFJf5b34y2bob4+rmjcJ2F4MRRG8C3
v91tkpai68nerYc2tNU0C+hav5QZ2DjW8KWns+rRblUW/5iRa/7uKhNHYs14Yv0
I/LddTlv5F5uv5K0YbmQIGx37aLLHjDngerh346N+z75kzJ18eEVnUPZUQ/ZB
btqb7GAKcIRViJJ+9rspGRJoIFjFIAUI7jThssGlzobaLjyW4IvMX0+VpGpr8zxM
ZfK0P4kr3Ou+TSVKLH0CBSfy4SgkcsdxVFkoyCEm7Pr4osxVhCfKc9JgihYldi1
xgt4U54nFagUrTbHjB+JYjHLqQYafPGCYfB9bR4M1/1jhV05F1V61zIwggAOMIIF
dqADAgECAgoY2dTA0AAAAA9MA0GCSqGSIb3DQEBAQUAMDMxGzAZBgNVBAsTEk1p
Y3Jvc29mdCBQSOkgVGVhbTEUMBIGA1UEAwWLRkKJfRW50U3ViQ0EwHhcNMDkwMzA1
MTgyNTQ1WhcNMTAwMzA1MTgyNTQ1WjCBvjETMBEGCgmsJomT8ixkARKWA2NvbTEZ
MbcGCGmsJomT8ixkARKWCW1pY3Jvc29mdDEWMBQGCgmsJomT8ixkARKWBm50dGVz
dDEdMBSGCGmsJomT8ixkARKWWDQ5LTEzNTFDMDQwNkEsREM9bnR0ZXN0LERDPWlpY3Jv
c29mdCwYDQDEwRhmJ5MTYwNAYJKoZIhvcNAQkBFidHJmJ5QE05LTEzNTFDMDQw
NkEuTlRURVNULk1JQ1JPU09GVC5DT00wgwEiMA0GCSqGSIb3DQEBAQUAA4IBDwAw
ggEKAoIBAQDT5P5QDhL2IpgZCb2m82qSsiZKi5211pthb5zulDQrVln/VnIW27pi
6pCgPQVHDiKhBeLVWTRboIt22oZ41I0xvTCLwGXd/wtGh7i1/MpfZnCFVYcmG
VcFHjIeBmEuYbFdDRWT9L12+3NG60kcr4b1s6vpBu6JtuKjE2QYEiEbGo3A1WPrh
i3YYscuALVzcOac8X0Uv9UARdcLA09wtG3H1strho9obC2KJchnXdh5Ncv7TrrK
Mo3N4rcNqNz/Y5Pmz+HgxtRpEYzDHI6sUOdDgc3u4V0H9oazRCU3eqTyDnQLm/B
8/w4j2GhDwEB/wQEAWIFoDbrBgNVHREEDBioDcGCisGAQQBgjcUAgOgKQwnYwJi
eUBkOS0xMzUxQzA0MDZBLm50dGVzdC5taWNYb3NvZnQuY29tgsdHmJ5QE05LTEz
NTFDMDQwNkEuTlRURVNULk1JQ1JPU09GVC5DT00wgesGA1UdHwSB4zCB4DCB3aCB
2qCB14aB1GxkYXA6Ly8vQ049RkKJfRW50U3ViQ0EwHhcNMDkwMzA1MTgyNTQ1WhcN
MTAwMzA1MTgyNTQ1WjCBvjETMBEGCgmsJomT8ixkARKWA2NvbTEZMbcGCGmsJomT8
ixkARKWBm50dGVzdDEdMBSGCGmsJomT8ixkARKWWDQ5LTEzNTFDMDQwNkEsREM9bnR0
ZXN0LERDPWlpY3Jvc29mdCxEQz1jb20/Y2VydG1maWnhdGVsZXZvY2F0aW9uTG1zdD9iYXNlP29iamVj
dENsYXNzPWNSTErc3RyaWJldG1vb1BvaW50MB8GA1UdIwQYMBaAFJ+3jZGC0QUd
0DHiPfaXeoF15VzIMCkGA1UdJQQUICAGCisGAQQBgjcKAwGCCsGAQUFBwEBBggr
BgEFBQcDAjANBgkqhkiG9w0BAQUFAAOCAQEAWLndycUwoaIU8itsOhThdSiImen
Izf4Gz4fOicwKucL0RaHbeKDBp5e91x1Z6My+4fbGn2o58vb05wRMfYa31HIngO/
+C2W+9p0xsPGXSfR8qwfYcPou6aZC40G21TSkclpZvuCqcOED2CPaHocW9f2OF
Z8OQyi+zFtNFY04B5219isyCoOwivF4EsbamTLlBqTRdPLBJ2Vz+BB/nwTemZz1
vd7ZBw89C9qebI6QVb8udRi21x50LqQZUtJyiWpv/3zhpR6eL9DobsxIrhc4Np7r
ft2hfopnHulZLhwFRk2GXGRZqBabDN06kCe1qV6X2gw1v6NbDRXc/OFFOTGCAakw
ggG1AgEBMEIwNDEbMBkGA1UECXMSTWljcm9zb2Z0IFBLSzSBuZWFtMRUwEwYDVQQD
DAxGQ19FbnRsb290Q0ECCmEmfNwAAAAAAIwCQYFKw4DAhoFAKA+MbcGCSqGSIb3
DQEJAzEKBggrBgEFBQcMMAzAjBgkqhkiG9w0BCCQXxfgQUY/W4vpjAGswflv6yOirp
M+kawEwDQYJKoZIhvcNAQEBBQAEggEAKQr0469R/EGRQaf4jdV1z/NGG+7WPnv8
SKS0h3U5ZwKUPHjCtLkfa7oJDgCMAA026/VVN3nAwCiFtA3ZCc+FA5d+5rmUtUq
k25eeCTaBH/6NyKvOddsGyKrt1Gzvj+uavqQ0uNhQeZyWBjNgW10Q09ENXcw4qe
I05oofT8Td5Z2wACKunoU/xrvrWoPoS58TksSDGkd/BWq8R6ZzaFdfjAF26bGB7Hi f5
OMzCxn5Sd/AILozG3F99/wnqijCxnsFPP6EYrVGs8gjDKfduaIb+cyw4X+wFZch2
DMryOkIN+6YDN60SNPgnHCMq+1P95IjX2aCk3EAYx3NWtf/BOu4Kcw==</BinarySecurityToken>
<RequestedSecurityToken>


```

Y29tP2N1cnRpZmljYXRlUmV2b2NhdGlvbkxpc3Q/YmFzZT9vYmplY3RDbGFzcz1j
UkxEaXN0cmliidXRpb25Qb2ludDCB2gYIKwYBBQUHAQEgC0wgcowgccGCCsGAQUF
BzAChoG6bGRhcDovLy9DTj1GQl9FbnRTdWJDQSxDTj1BSUESQ049UHVibGljJTIw
S2V5JTIwU2VydmljZXMsQ049U2Vydm1jZXMsQ049Q29uZmlndXJhdGlvbixEQzlk
OS0xMzUxQzA0MDZBLERDPW50dGVzdCxEQz1taWNyb3NvZnQsREM9Y29tP2NBQ2Vy
dGlmaWNhdGU/YmFzZT9vYmplY3RDbGFzcz1jZXJ0aWZpY2F0aW9uQXV0aG9yaXR5
MCMGCSSGAQQBgjcUAgQWWhQAQwBBAEUAeABjAGgAYQBAGcAZTA3BgkrBgEAYI3
FQcEKjAoBiArBgEEAYI3FQiDpLIy7eQShOGZGYGtn3+D2dR4gUYBGgIBagIBADAU
BgnVHSUEDTALBgkrBgEAYI3FQUwDgYDVR0PAQH/BAQDAgUgMBwGCSsGAQQBgjcV
CgQPMA0wCwYJKwYBBAGCNxUFMA0GCSqGSIb3DQEBBQUAA4IBAQDESvFy3wA1iBjJ
pcWYC736HTLsu+90215XQvfFvqswJayHQy6aRGvkoWf6qQcm8IJFp2fM/K29ov1o
KEdR1U/zC36TEL2jCxtJAw9/bwA5XEm9Ph+TFBH9focXfCS9FisFuuJzdaL357eI
WXBukYDgzQXJcl+naKjC+74dKft/T7URU0e/8TRX0LFLxJG+7tECNEtSE5/oBMMo
yF+HNuMsjyoXmVzohWB3J7/9ULMpI6lc0BrLVIKghMmCuIDkIuv67WQj/6NfG7uR
shWg/QbRwuEQk2ls9D9dtZwrN7XWgBbNAF6FnwZg7X9GqIDQ9erb6sZPYWg5Gbiz
XVTXYIKj</BinarySecurityToken>
</KeyExchangeToken>
</RequestedSecurityToken>
</RequestSecurityTokenResponse>
</RequestSecurityTokenResponseCollection>
</s:Body>
</s:Envelope>

```

4.1.3 Retrieval of a previously pended certificate request with Query Token Status

4.1.3.1 Client Request

```

<s:Envelope xmlns:a="http://www.w3.org/2005/08/addressing"
xmlns:s="http://www.w3.org/2003/05/soap-envelope">
  <s:Header>
    <a:Action s:mustUnderstand="1">
http://schemas.microsoft.com/windows/pki/2009/01/enrollment/RST/wstep</a:Action>
    <a:MessageID>urn:uuid:ce330bb2-0ca2-473b-a29a-19e9264666ff</a:MessageID>
    <a:ReplyTo>
    <a:Address>http://www.w3.org/2005/08/addressing/anonymous</a:Address>
    </a:ReplyTo>
    </s:Header>
    <s:Body xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
    <RequestSecurityToken xmlns="http://docs.oasis-open.org/ws-sx/ws-trust/200512">
    <TokenType>http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-x509-token-profile-
1.0#X509v3</TokenType>
    <RequestType>http://schemas.microsoft.com/windows/pki/2009/01/enrollment/QueryTokenStatus</
RequestType>
    <RequestID
xmlns="http://schemas.microsoft.com/windows/pki/2009/01/enrollment">65</RequestID>
    </RequestSecurityToken>
    </s:Body>
  </s:Envelope>

```


4.1.4 Message exchange with a server fault

4.1.4.1 Client Request

See section [4.1.1.1](#) for an example of a client request.

4.1.4.2 Server Fault Response

```
<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
xmlns:a="http://www.w3.org/2005/08/addressing">
  <s:Header>
    <a:Action s:mustUnderstand="1">http://schemas.microsoft.com/net/2005/12/
windowscommunicationfoundation/dispatcher/fault</a:Action>
    <a:RelatesTo>urn:uuid:ce330bb2-0ca2-473b-a29a-19e9264666ff</a:RelatesTo>
    <ActivityId CorrelationId="4f0e4425-4883-41c1-b704-771135d18f84"
xmlns="http://schemas.microsoft.com/2004/09/ServiceModel/Diagnostics">
eda7e63d-0c42-455d-9c4f-47ab85803a50</ActivityId>
  </s:Header>
  <s:Body>
    <s:Fault>
      <s:Code>
        <s:Value>s:Receiver</s:Value>
        <s:Subcode>
          <s:Value xmlns:a="http://schemas.microsoft.com/net/2005/12/windowscommunicationfoundation/
dispatcher">a:InternalServiceFault</s:Value>
        </s:Subcode>
      </s:Code>
      <s:Reason>
        <s:Text xml:lang="en-US">The server was unable to process the request
due to an internal error. For more information about the error, either turn
on IncludeExceptionDetailInFaults (either from ServiceBehaviorAttribute or
from the &lt;&serviceDebug>&gt; configuration behavior) on the server in order to
send the exception information back to the client, or turn on tracing as per
the Microsoft .NET Framework 3.0 SDK documentation and inspect the server
trace logs.</s:Text>
      </s:Reason>
    </s:Fault>
  </s:Body>
</s:Envelope>
```

4.1.5 Certificate Renewal

4.1.5.1 Client Renewal Request

```
<s:Envelope xmlns:a="http://www.w3.org/2005/08/addressing"
xmlns:s="http://www.w3.org/2003/05/soap-envelope">
  <s:Header>
    <a:Action s:mustUnderstand="1">http://schemas.microsoft.com/windows/pki/2009/
01/enrollment/RST/wstep</a:Action>
    <a:MessageID>urn:uuid:b0a9b388-2581-451d-8c03-270d4ffe2928</a:MessageID>
    <a:ReplyTo>
      <a:Address>http://www.w3.org/2005/08/addressing/anonymous</a:Address>
    </a:ReplyTo>
  </s:Header>
```

<s:Body xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<RequestSecurityToken xmlns="http://docs.oasis-open.org/ws-sx/ws-trust/200512">
<TokenType>http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-x509-token-profile-1.0#X509v3</TokenType>
<RequestType>http://docs.oasis-open.org/ws-sx/ws-trust/200512/Issue</RequestType>
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4.1.5.2 Server Request Security Token Response

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DQEJAZEBGgrBgEFBQcMMAZAJBgkqhkiG9w0BCQQxFgQUoOwV5P4v001TWL71ZHHO
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hZBPEYQCLKpgCTMmVuzk6NdEim2z7RXUMIFBmjDTA6M9FdLmMKQDw==</BinarySecurityToken>

<RequestedSecurityToken>
<BinarySecurityToken
ValueType="http://docs.oasis-open.org/wss/2004/01/
oasis-200401-wss-x509-token-profile-1.0#X509v3"

EncodingType="http://docs.oasis-open.org/wss/2004/01/
oasis-200401-wss-wssecurity-secext-1.0.xsd#base64binary"
xmlns="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-secext-
1.0.xsd">MIIGjjCCBXagAwIBAgIKGNnsjgAAAAAPzANBgkqhkiG9w0BAQUFADAzMRswGQYD
VQQLExJNaWNyb3NvZnQzUEtJIFRlYW0xZDASBgNVBAMMC0ZCX0VudFNlYkNBMB4X
DTA5MDMwNTE4MjYyMVoXDTEwMDMwNTE4MjYyMVoWgb4xEzARBgoJkiaJk/IsZAEZ
FgNjb20xGTAxBgoJkiaJk/IsZAEZFgltaWNyb3NvZnQzFjAUBgoJkiaJk/IsZAEZ
FgZudHRlc3QxHTAbBgoJkiaJk/IsZAEZFg1kOS0xMzUxQzA0MDZBMQ4wDAYDVQQD
EwVvc2Vyc2ENMASGAlUEAxMEYWIeTE2MDQGCsGSIb3DQEJARYnYWJieUBEOS0x
MzUxQzA0MDZBLk5UVEVTVC5NSUNST1NPRlQuQ09NMIIBIjANBgkqhkiG9w0BAQEF
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eMD2UEBiuJK569Yz0M1FFP9SDlUMbPI2Z809dcrVP13zy6Kk5uqdxehpLC3tJE9DC
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OIuaVEUZ4+kTfFXpjiFUEm/10e7It134ucGrijQuqwIDAQABO4IDFjCCAxIwRAYJ
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BSsOAwIHMaoGCCqGSIb3DQMHMBcGCSsGAQQBgjcUAQKQKggAVQzAGUAcjCB2gYI
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Qz1taWNyb3NvZnQzREM9Y29tP2NBQ2VydG1maWNhdGU/YmFzZT9vYmplY3RDdbGFz
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ZRfhPYEZ0zaOBgNVHQ8BAf8EBAMCBAAwawYDVR0RBGQwYqA3BgorBgEEAYI3FAID
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UBEOS0xMzUxQzA0MDZBLk5UVEVTVC5NSUNST1NPRlQuQ09NMIHRBGNVHR8EgeMw
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P+I=</BinarySecurityToken>
</RequestedSecurityToken>
<RequestID
xmlns="http://schemas.microsoft.com/windows/pki/2009/01/enrollment">63</RequestID>
</RequestSecurityTokenResponse>
</RequestSecurityTokenResponseCollection>
</s:Body>
</s:Envelope>

5 Security

5.1 Security Considerations for Implementers

None.

5.2 Index of Security Parameters

None.

6 Appendix A: Full WSDL

The WSTEP protocol is a profile extension of WS-Trust1.3. As such, it does not have a WSDL.

WS-Trust 1.3 WSDL: The full WSDL for WS-Trust can be found at: <http://docs.oasis-open.org/ws-sx/ws-trust/200512/ws-trust-1.3.wsdl>.

WSTEP XML Schema: For the convenience of implementation, the XML schema is provided here.

```
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
           xmlns:wstep="http://schemas.microsoft.com/windows/pki/2009/01/enrollment"
           targetNamespace="http://schemas.microsoft.com/windows/pki/2009/01/enrollment"
           elementFormDefault="qualified">

  <xs:import namespace="http://www.w3.org/XML/1998/namespace"
            schemaLocation="http://www.w3.org/2001/xml.xsd" />

  <xs:element name="DispositionMessage" type="wstep:DispositionMessageType" nillable="true" />
  <xs:complexType name="DispositionMessageType">
    <xs:simpleContent>
      <xs:extension base="xs:string">
        <xs:attribute ref="xml:lang" use="optional" />
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>
  <xs:element name="CertificateEnrollmentWSDetail" nillable="true"
            type="wstep:CertificateEnrollmentWSDetailType" />
  <xs:complexType name="CertificateEnrollmentWSDetailType">
    <xs:sequence>
      <xs:element minOccurs="0" maxOccurs="1" name="BinaryResponse" nillable="true"
            type="xs:string" />
      <xs:element minOccurs="0" maxOccurs="1" name="ErrorCode" nillable="true" type="xs:int" />
      <xs:element minOccurs="0" maxOccurs="1" name="InvalidRequest" nillable="true"
            type="xs:boolean" />
      <xs:element minOccurs="0" maxOccurs="1" name="RequestID" type="xs:string"
            nillable="true" />
    </xs:sequence>
  </xs:complexType>
  <xs:element name="RequestID" type="xs:string" nillable="true" />
  <xs:attribute name="PreferredLanguage" type="xml:language" use="optional"/>
</xs:schema>
```


7 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs:

- Windows 7 operating system
- Windows Server 2008 R2 operating system
- Windows 8 operating system
- Windows Server 2012 operating system
- Windows 8.1 operating system
- Windows Server 2012 R2 operating system

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that the product does not follow the prescription.

[<1> Section 3.1.3:](#) Windows servers set the *DefaultLanguage* parameter to the installed language.

8 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

9 Index

A

[Abstract data model](#) 15
[Applicability](#) 11
[Attribute groups](#) 13
Attributes
 [overview](#) 13
 [RequestSecurityToken2](#) 23
[Authentication](#) 15

C

[Capability negotiation](#) 11
[Change tracking](#) 42
Complex types
 [overview](#) 12
 RequestSecurityToken2
 [DispositionMessageType](#) 18
 [overview](#) 18
 [RequestedSecurityTokenEnrollmentType](#) 18
 [RequestSecurityTokenEnrollmentType](#) 19
 [RequestSecurityTokenResponseCollectionEnrollmentType](#) 22
 [RequestSecurityTokenResponseEnrollmentType](#) 21
 [RequestTypeEnum](#) 23

D

[Data model - abstract](#) 15

E

Elements
 [overview](#) 12
 RequestSecurityToken2
 [DispositionMessage](#) 17
 [RequestID](#) 17
 [RequestSecurityToken](#) 17
 [RequestSecurityTokenResponseCollection](#) 17
 [RequestType](#) 18
 [TokenType](#) 18
Events
 [local](#) 26
 [timer](#) 25
[Examples - RequestSecurityToken request/response message sequence](#) 27

F

[Fields - vendor-extensible](#) 11
[Full WSDL](#) 40

G

[Glossary](#) 6
[Groups](#) 13

I

[Implementer - security considerations](#) 39
[Index of security parameters](#) 39
[Informative references](#) 8
[Initialization](#) 15
[Introduction](#) 6
[Issue request processing](#) 24

K

[Key Exchange Token request processing](#) 25

L

[Local events](#) 26

M

Message processing
 [overview](#) 16
 RequestSecurityToken2
 [attributes](#) 23
 [complex types](#) 18
 [elements](#) 17
 [messages](#) 16
 [overview](#) 16

Messages
 [attribute groups](#) 13
 [attributes](#) 13
 [complex types](#) 12
 [elements](#) 12
 [enumerated](#) 12
 [groups](#) 13
 [namespaces](#) 12
 [simple types](#) 12
 [syntax](#) 12
 [transport](#) 12

N

[Namespaces](#) 12
[Normative references](#) 7

O

[Overview \(synopsis\)](#) 8

P

[Parameters - security index](#) 39
[Preconditions](#) 11
[Prerequisites](#) 11
Processing rules
 [Issue request](#) 24
 [Key Exchange Token request](#) 25
 [overview](#) 24
 [QueryTokenStatus request](#) 25
 [Renew request](#) 24
[Product behavior](#) 41

Q

[QueryTokenStatus request processing](#) 25

R

References

[informative](#) 8

[normative](#) 7

[Relationship to other protocols](#) 10

[Renew request processing](#) 24

[RequestSecurityToken request/response message sequence example](#) 27

RequestSecurityToken2

[attributes](#) 23

complex types

[DispositionMessageType](#) 18

[overview](#) 18

[RequestedSecurityTokenEnrollmentType](#) 18

[RequestSecurityTokenEnrollmentType](#) 19

[RequestSecurityTokenResponseCollectionEnrollmentType](#) 22

[RequestSecurityTokenResponseEnrollmentType](#) 21

[RequestTypeEnum](#) 23

elements

[DispositionMessage](#) 17

[RequestID](#) 17

[RequestSecurityToken](#) 17

[RequestSecurityTokenResponseCollection](#) 17

[RequestType](#) 18

[TokenType](#) 18

messages

[overview](#) 16

[RequestSecurityTokenMsg](#) 16

[RequestSecurityTokenResponseCollectionMsg](#) 16

[overview](#) 16

S

Security

[implementer considerations](#) 39

[parameter index](#) 39

SecurityTokenService server

[abstract data model](#) 15

[initialization](#) 15

[local events](#) 26

message processing

[overview](#) 16

[RequestSecurityToken2](#) 16

[overview](#) 14

processing rules

[Issue request](#) 24

[Key Exchange Token request](#) 25

[overview](#) 24

[QueryTokenStatus request](#) 25

[Renew request](#) 24

sequencing rules

[overview](#) 16

[RequestSecurityToken2](#) 16

[timer events](#) 25

[timers](#) 15

Sequencing rules

[overview](#) 16

RequestSecurityToken2

[attributes](#) 23

[complex types](#) 18

[elements](#) 17

[messages](#) 16

[overview](#) 16

[Server - SecurityTokenService - overview](#) 14

[Simple types](#) 12

[Standards assignments](#) 11

[Syntax - messages - overview](#) 12

T

[Timer events](#) 25

[Timers](#) 15

[Tracking changes](#) 42

[Transport](#) 12

Types

[complex](#) 12

[simple](#) 12

V

[Vendor-extensible fields](#) 11

[Versioning](#) 11

W

[WSDL](#) 40