Web Services Security Username Token Profile

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Abstract:

This document describes how to use the UsernameToken with the Web Services Security (WSS) specification.

Status:

This is a working draft submitted for consideration by the OASIS Web Services Security (WSS) technical committee. Please send comments to the editors.

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For patent disclosure information that may be essential to the implementation of this specification, and any offers of licensing terms, refer to the Intellectual Property Rights section of the OASIS Security Services Technical Committee (SSTC) web page at http://www.oasis-open.org/who/intellectualproperty.shtml.

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1 Introduction

This document describes how to use the UsernameToken with the Web Services Security (WSS) specification.

Section 1 is non-normative.

2 Terminology

The key words *must*, *must not*, *required*, *shall*, *shall not*, *should*, *should not*, *recommended*, *may*, and *optional* in this document are to be interpreted as described in RFC2119 [12].

Namespace URIs (of the general form "some-URI") represent some application-dependent or context-dependent URI as defined in RFC 2396 [13].

This specification design is intended to work with any version the general SOAP [3] message structure and processing model, though the SOAP 1.2 namespace URI is used in examples.

Commonly used security terms are defined in the Internet Security Glossary [14].

The namespaces used in this document are shown in the following table.

Prefix	Namespace
S	http://www.w3.org/2001/12/soap-envelope
wsse	http://schemas.xmlsoap.org/ws/2002/xx/secext

3 Acronyms and Abbreviations

Term	**Definition**
SHA	Secure Hash Algorithm
SOAP	Simple Object Access Protocol
URI	Uniform Resource Identifier

UCS	Universal Character Set
UTF8	UCS Transformation Format, 8-bit form
XML	Extensible Markup Language

4 UsernameToken Extensions

4.1 Usernames and Passwords

The <wsse:UsernameToken> element is introduced in the WSS-Core documents as a way of providing a username

Within this element, a <wsse:Password> element may be specified. The password has an associated type – either wsse:PasswordText or wsse:PasswordDigest. The wsse:PasswordText is not limited to only the actual password. Any password equivalent such as a derived password or S/KEY (one time password) can be used.

The wsse:PasswordDigest is defined as a Base64 [16] encoded SHA-1 hash value of the UTF8 [17] encoded password. However, unless this digested password is sent on a secured channel, the digest offers no real additional security over use of wsse:PasswordText.

To address this issue, two optional elements are introduced in the <wsse:UsernameToken> element: <wsse:Nonce> and <wsu:Created>. If either of these is present, they must be included in the digest value as follows:

Password_digest = SHA-1 (nonce + created + password)

That is, concatenate the nonce, creation timestamp, and the password (or shared secret or password equivalent) and include the digest of the combination. This helps obscure the password and offers a basis for preventing replay attacks. It is recommended that timestamps and nonces be cached for a given period of time, as a guideline a value of five minutes can be used as a minimum to detect replays, and that timestamps older than that given period of time set be rejected.

Note that the nonce is hashed using the octet sequence of its decoded value while the timestamp is hashed using the octet sequence of its UTF8 encoding as specified in the contents of the element.

Note that password digests should not be used unless the plain text password, secret, or password equivalent is available to both the requestor and the recipient.

The following illustrates the XML [2] syntax of this element:

```
<wsse:UsernameToken wsu:Id="Example-1">
   <wsse:Username> ... </wsse:Username>
   <wsse:Password Type="..."> ... </wsse:Password>
   <wsse:Nonce EncodingType="..."> ... </wsse:Nonce>
   <wsu:Created> ... </wsu:Created>
</wsse:UsernameToken>
```

The following describes the attributes and elements listed in the example above:

/wsse:UsernameToken/Password

This optional element provides password information. It is recommended that this element only be passed when a secure transport is being used.

/wsse:UsernameToken/Password/@Type

This optional attribute specifies the type of password being provided. The following table identifies the pre-defined types:

Value	**Description**
wsse:PasswordText (default)	The actual password for the username or derived password or S/KEY.
wsse:PasswordDigest	The digest of the password for the username using the algorithm described above.

/wsse:UsernameToken/Password/@{any}

This is an extensibility mechanism to allow additional attributes, based on schemas, to be added to the header.

/wsse:UsernameToken//wsse:Nonce

This optional element specifies a cryptographically random nonce.

/wsse:UsernameToken//wsse:Nonce/@EncodingType

This optional attribute specifies the encoding type of the nonce (see the definition of <wsse:BinarySecurityToken> for valid values). If this attribute isn't specified then the default of Base64 encoding is used.

/wsse:UsernameToken//wsu:Created

This optional element which specifies a timestamp.

All compliant implementations must be able to process the `<wsse:UsernameToken>` element. The following example illustrates the use of this element. In this example the password is sent as clear text and therefore this message should be sent over a confidential channel:

```
<S:Envelope xmlns:S="http://www.w3.org/2001/12/soap-envelope"
   xmlns:wsse="http://schemas.xmlsoap.org/ws/2002/xx/secext">
   <S:Header>
      ...
      <wsse:Security>
         <wsse:UsernameToken >
            <wsse:Username> Zoe </wsse:Username>
            <wsse:Password> ILoveDogs </wsse:Password>
         </wsse:UsernameToken>
      </wsse:Security>
      ...
   </S:Header>
   ...
</S:Envelope>
```

The following example illustrates a hashed password using both a nonce and a timestamp with the password hashed:

```
<S:Envelope xmlns:S="http://www.w3.org/2001/12/soap-envelope"
   xmlns:wsse="http://schemas.xmlsoap.org/ws/2002/xx/secext">
   <S:Header>
      ...
      <wsse:Security>
         <wsse:UsernameToken
            xmlns:wsse="http://schemas.xmlsoap.org/ws/2002/xx/secext"
            xmlns:wsu="http://schemas.xmlsoap.org/ws/2002/xx/utility">
            <wsse:Username> NNK </wsse:Username>
            <wsse:Password Type="wsse:PasswordDigest">
               D2A12DFE8D9F0C6BB82C89B091DF5C8A872F94DC
            </wsse:Password>
            <wsse:Nonce> EFD89F06CCB28C89 </wsse:Nonce>
            <wsu:Created> 2001-10-13T09:00:00Z </wsu:Created>
         </wsse:UsernameToken>
      </wsse:Security>
      ...
   </S:Header>
   ...
</S:Envelope>
```

4.2 Error Codes

Implementations may use custom error codes defined in private namespaces if needed. But it is recommended that they use the error handling codes defined in the WS-Security specification for signature, decryption, encoding and token header errors. When using custom error codes, implementations should be careful not to introduce security vulnerabilities that may assist an attacker in the error codes returned.

4.3 Threat Model

The use of the Username token introduces no new threats beyond those already identified for other types of WS-Security tokens. Confidentiality is addressed directly in the Username token by using the privacy mechanisms described in WS-Security. Replay attacks can be addressed by using message timestamps and caching, as well as other application-specific tracking mechanisms. Token ownership is verified by use of keys and man-in-the-middle attacks are generally mitigated. Transport-level security may be used to protect this security token.

5 References

5.1 Normative

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Appendix A. Acknowledgments

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

- TBD

Appendix B. Revision History

Rev	Date	By Whom	What
Wd-1.0	2002-12-16	Phil Griffin	Initial version cloned from the WSS core specification
Wd-1.1	2003-01-26	Anthony Nadalin	Bring in line with WSS-Core Update

Appendix C. Notices

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