



# BEA AquaLogic Enterprise Security™®

## Programming Security for Web Services

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# About This Document

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## Audience for this Document

It is assumed that the reader understands Web Services technologies and has a general understanding of the Microsoft Windows or UNIX operating systems being used. This document is intended for the following audiences:

- **Web Services Developers**—Developers who are programmers who focus on developing Web services applications and who work with other engineering, quality assurance (QA), and database teams to implement security features. Web services developers have in-depth working knowledge of Web Services programming.

- **Application Developers**—Developers who focus on designing applications and work with other engineers, quality assurance (QA) technicians, and database teams to implement applications.
- **Security Administrators**—Administrators who are responsible for installing and configuring the AquaLogic Enterprise Security products and designing policy. Security administrators work with other administrators to implement and maintain security configurations, authentication and authorization schemes, and to set up and maintain access to deployed application resources. Security administrators have a general knowledge of security concepts and the AquaLogic Enterprise Security architecture.

## Prerequisites for this Document

Prior to reading this guide, you should read the *Introduction to BEA AquaLogic Enterprise Security*. This document describes how the product works and provides conceptual information that is helpful to understanding the necessary installation components.

Additionally, BEA AquaLogic Enterprise Security includes many unique terms and concepts that you need to understand. These terms and concepts—which you will encounter throughout the documentation—are defined in the *Glossary*.

## Contents of this Document

This document is organized as follows:

- Chapter 1 (this chapter) provides an overview of the Web Services Security Service Module and the related standards and features it supports.
- [Chapter 2, “Web Services Interfaces,”](#) describes the Web Services interfaces and the methods that each interface supports.

## Product Documentation on the dev2dev Web Site

The BEA AquaLogic Enterprise Security documentation is available from the BEA dev2dev e-docs web site:

<http://e-docs.bea.com/ales/docs21/index.html>

Each link refers to a specific topic related to the product. For a complete list of documents available, see the Documents page on the e-docs web site:

<http://e-docs.bea.com/ales/docs21/document.html>

A PDF version of each document is also available on the BEA AquaLogic Enterprise Security. For a complete list of documents available, see the Documentation Download page on the e-docs web site:

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## Related Information

The BEA corporate web site provides all documentation for BEA AquaLogic Enterprise Security. Other BEA AquaLogic Enterprise Security documents that may be of interest to the reader include:

- *WSDL Documentation for the Web Service Interfaces*—This document provides reference documentation for the Web Services Interfaces that are provided with and supported by this release of BEA AquaLogic Enterprise Security.
- *Administration and Deployment Guide*—This document provides step-by-step instructions for performing various administrative tasks.
- *Integrating ALES with Application Environments*—This document describes important tasks associated with integrating AquaLogic Enterprise Security into application environments.
- *Policy Managers Guide*—This document how to write access control policies for BEA AquaLogic Enterprise Security, and describes how to import and export policy data.
- *Installing the Web Server and Web Services Security Service Modules*—This document describes how to install Web Services Security Service Module.
- *Developing Security Providers* —This document provides security vendors and security and application developers with the information needed to develop custom security providers.

- *Javadocs for Security Service Provider Interfaces*—This document provides reference documentation for the Security Service Provider Interfaces that are provided with and supported by this release of BEA AquaLogic Enterprise Security.
- *Programming Security for Java Applications*—The document describes how to implement security in Java applications. It include descriptions of the Security Service Application Programming Interfaces and programming instructions for implementing security in Java applications.
- *Javadocs for Java API*—This document provides reference documentation for the Java Application Programming Interfaces that are provided with and supported by this release of BEA AquaLogic Enterprise Security.

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When contacting Customer Support, be prepared to provide the following information:

- Your name, e-mail address, phone number, and fax number
- Your company name and company address
- Your machine type and authorization codes
- The name and version of the product you are using
- A description of the problem and the content of pertinent error messages

# Introduction to the Web Services Security Service Module

This section provides an introduction to AquaLogic Enterprise Security Web Services Security Service Module and describes interfaces clients use to interact with it.

This section covers the following topics:

- [“Overview of Web Services” on page 1-1](#)
- [“Product Overview” on page 1-2](#)
- [“Product Features” on page 1-10](#)

## Overview of Web Services

Web services are a special type of service that can be shared by and used as components of distributed Web-based applications. Web services interface with existing back-end applications, such as customer relationship management systems, order-processing systems, and so on.

Traditionally, software application architecture tended to fall into two categories: huge monolithic systems running on mainframes or client-server applications running on desktops. Although these architectures work well for the purpose the applications were built to address, they are closed and cannot be easily accessed by the diverse users of the Web. Thus the software industry has evolved toward loosely coupled service-oriented applications that interact dynamically over the Web. The applications break down the larger software system into smaller modular components, or shared services. These services can reside on different computers and can be implemented by vastly different technologies, but they are packaged and transported using standard Web protocols, such as Extensible Markup Language (XML) and Hyper Text Transfer Protocol (HTTP), thus making them easily accessible by any user on the Web.

This concept of services is not new. Remote Method Invocation (RMI), Component Object Model (COM), and Common Object Request Broker Architecture (CORBA) are all service-oriented technologies. However, applications based on these technologies must be written using that particular technology, often as implemented by a particular vendor. This requirement typically hinders widespread acceptance of such services on the Web. To solve this problem, web services are defined to share the following properties that make them easily accessible from heterogeneous environments:

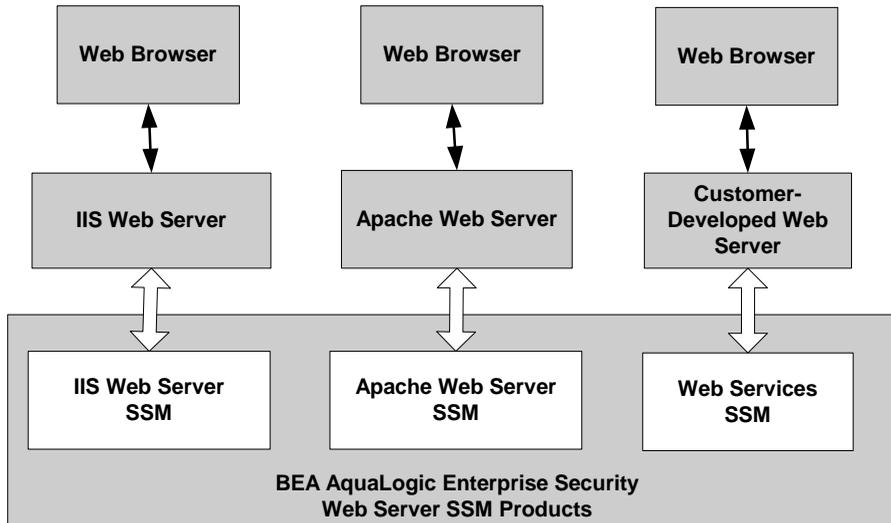
- Web services are accessed over the Web.
- Web services describe themselves using an XML-based description language.
- Web services communicate with clients (both end-user applications or other web services) through XML messages that are transmitted by standard Internet protocols, such as HTTP.

## Product Overview

The BEA AquaLogic Enterprise Security provides three Web Server Security Service Modules (SSMs): the IIS Web Server SSM, the Apache Web Server SSM, and the Web Services SSM (see

[Figure 1-1](#)). This document only describes the Web Services SSM and the security service application programming interfaces (APIs) that it supports.

**Figure 1-1 Web Server and Web Services SSMs**



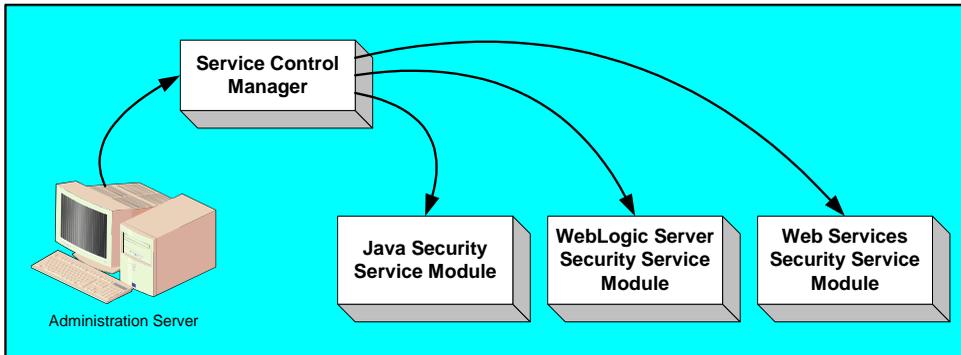
The following topics provide more information on the these products:

- [“Web Services Environment”](#) on page 1-3
- [“Web Services Security Service Module”](#) on page 1-5
- [“Client Trust Model”](#) on page 1-6
- [“Deployment Model”](#) on page 1-7
- [“Usage Model”](#) on page 1-8

## Web Services Environment

[Figure 1-2](#) shows the major components that make up the BEA AquaLogic Enterprise Security product environment.

Figure 1-2 AquaLogic Enterprise Security Product Environment



- Administration Server

The Administration Server allows you to configure, deploy, and manage multiple Security Service Modules in a distributed environment. While the modules consume configuration data and then service security requests accordingly, the Administration Server allows you to configure and deploy security configuration information to the modules and modify that information as needed.

- Service Control Manager

The Service Control Manager (SCM) is an essential component of the configuration provisioning mechanism and a key component of a fully-distributed security enforcement architecture. A SCM is a machine agent that exposes a provisioning, or deployment, interface to the Administration Server to facilitate the management of a potentially large number of distributed Security Service Modules (SSMs). The SCM can receive and store meta-data updates, both full and incremental, initiated by the Administration Server.

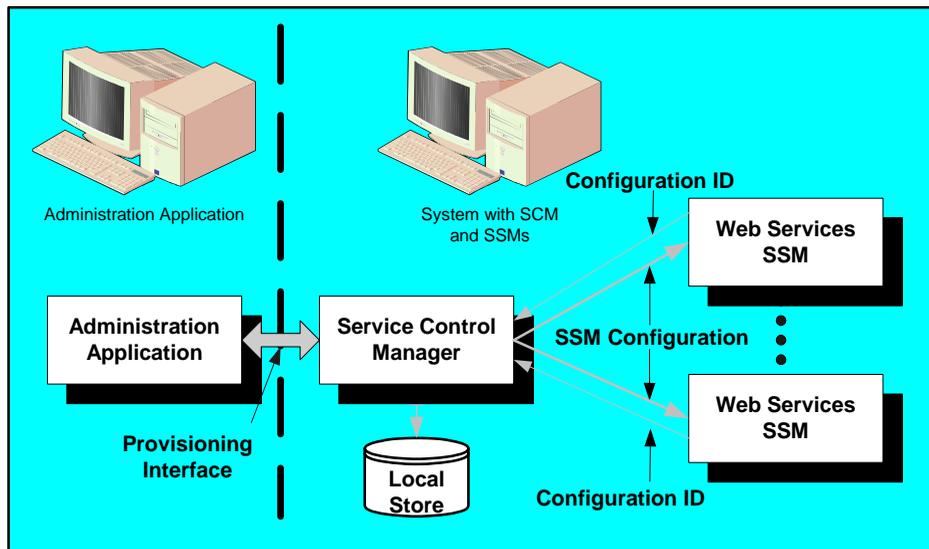
The Administration Server uses this provisioning mechanism to distribute configuration data to each created instance of a SSM where it is consumed locally (see [Figure 1-3](#)). Each instance of a SSM is assigned a unique configuration ID, which is registered with the SCM when the SSM is enrolled. The SCM uses the configuration ID when distributing and updating configuration data to each SSM instance to ensure that the correct data is distributed.

- Web Services Security Service Module

The Web Services SSM provides an application programming interface (API) that allows security developers to write custom applications that invoke AquaLogic Enterprise Security services through SOAP. These interfaces support the most commonly required security

functions and are organized into services that are logically grouped by functionality. You define and deploy the security configuration using the Administration Server. You can configure more than one instance of the Web Services SSM on a single machine, however, each instance must run in separate process. The number of machines in your network on which you can configure a Web Services SSM is unlimited (see [Figure 1-3](#)). After you deploy the initial security configuration to a Web Server SSM, it does not require any additional communication with the Service Control Manager (SCM) to perform runtime security functions. However, the SCM does maintain communication with each Web Services SSM instance so that it can distribute, or deploy, full and incremental security configuration and updates and updates to access control policies.

**Figure 1-3 Deploying Security Configuration and Policy Data**



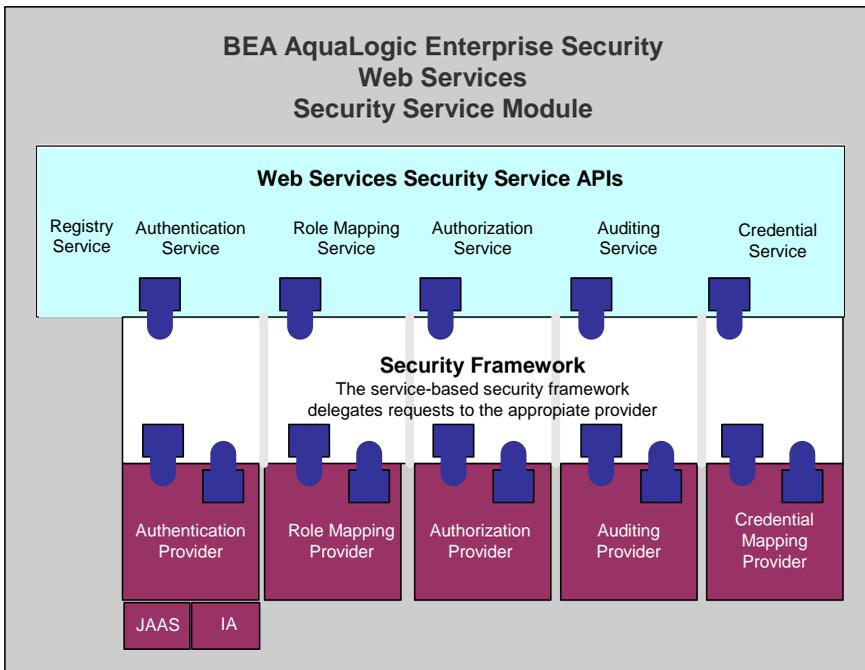
## Web Services Security Service Module

The Web Services Security Service Module (SSM) provides five security service APIs: Authentication, Authorization, Auditing, Role Mapping, and Credential Mapping (see [Figure 1-4](#)). These APIs can be used to develop web services clients to access the AquaLogic Enterprise Security infrastructure and use it to make access control decisions for users attempting to access web server application resources. Once the web services client is implemented, it uses the Web Services SSM (which incorporates the Security Services APIs, the Security Framework, and the configured security providers) to make access control decisions for the web server to

which it is connected. Then you can use the AquaLogic Enterprise Security Administration Server to configured and deploy a security configuration to protect the web server application resources. Thus, the Web Services SSM enables security administrators and web developers to perform security tasks for applications running on a web server. Additionally, you can use the Web Services SSM to add information provided by the Security Framework (such as roles and response attributes) to the HTTP requests handled by the protected web server applications.

Figure 1-4 shows the components of the Web Services SSM.

Figure 1-4 Web Services SSM Architecture



For a description of the Web Services Security Service APIs, see “Web Services Interfaces” on page 2-1

## Client Trust Model

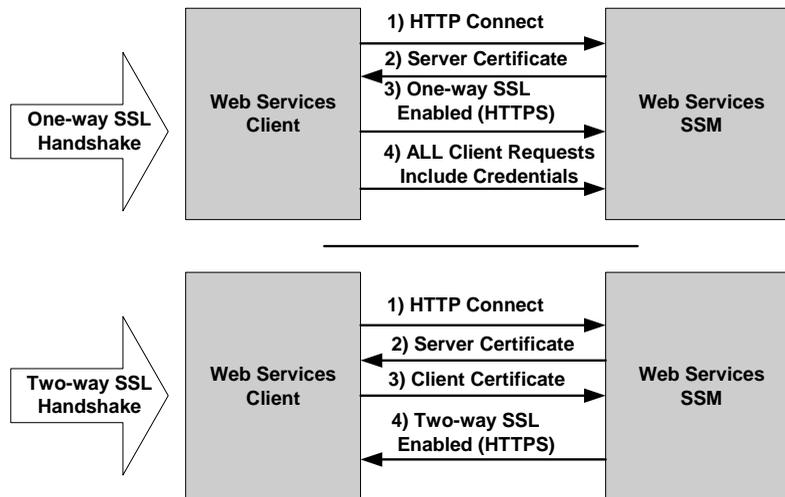
To protect messages in transit between the client and the Web Services SSM, a channel security protocol (SSL 3.0 or TLS 1.0) is used for all communication between the two. The Web Services SSM supports both one-way and two-way SSL (see Figure 1-5). To establish an SSL connection

with one-way SSL, only the server is required to present a digital certificate. With two-way SSL authentication, both the client and server must present digital certificates before the SSL connection is enabled between the two. Thus, with two-way SSL, the Web Services SSM not only authenticates itself to the client to complete the SSL handshake (which is the minimum requirement for certificate authentication), but it also requires authentication from the requesting client. The client first authenticates the server's certificate, and then the server authenticates the client's certificate. The client certificate must be signed by a recognized certificate authority (CA).

As mentioned, Web services clients can communicate with the Web Services SSM over one-way or two-way SSL connections. However, when the client communicates over a one-way SSL, each client request be accompanied by a valid client name/password pair or a ALES cookie. [Figure 1-5](#) shows the Web Services SSM client trust model.

For more information on authentication, see [“Authentication Service Interface” on page 2-4](#).

**Figure 1-5 Client Trust Model**

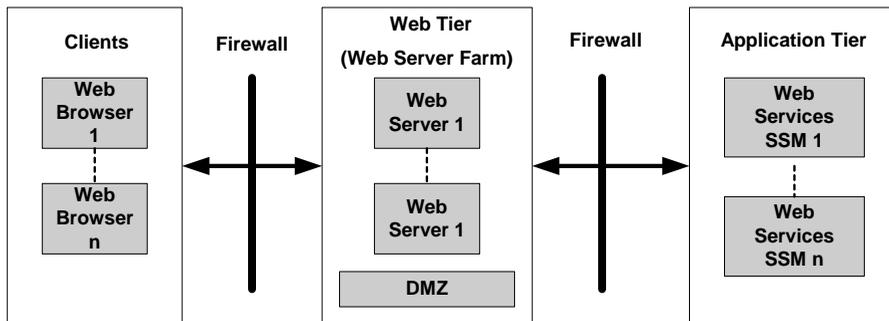


## Deployment Model

[Figure 1-6](#) shows how you typically deploy instances of Web Services Security Service Modules (SSM) to protect application resources. The web servers (the web services clients) are located in the web tier, which is in the Demilitarized Zone (DMZ), and are protected from unwanted traffic on the Internet by a firewall. The DMZ is created by using two firewalls. If the web servers and

Web Services SSMs are running on different machines, the Web Services SSMs are located in the application tier behind the second firewall for added security. The Web Services SSM supports Secure Sockets Layer (SSL) communication so all traffic between the web servers and the SSM is encrypted.

**Figure 1-6 Typical Web Services Deployment Model**

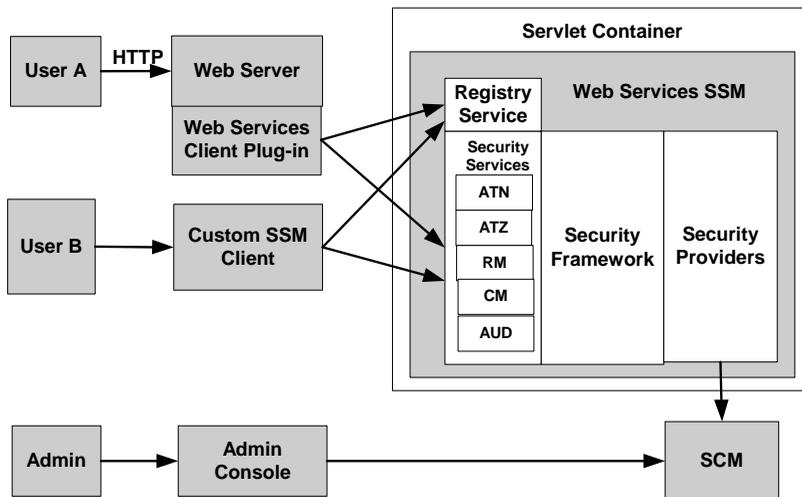


## Usage Model

Once the Web Services client has established an SSL connection with the Web Services SSM, it can issue requests on behalf of users for access to the web resources protected by the Web Services SSM (see [Figure 1-7](#)).

- User A uses web servers with web services client plug-ins to access the Registry Service and locate specific instances of SSMs and a specific security service on that SSM instance. The Web servers use that information to make requests access to application resources on behalf of users. BEA provides two web server products that have built-in web services clients, the IIS Web Server SSM and the Apache Web Server SSM.
- User B uses a custom SSM client, which has a user-written web services client, to access the Registry Service and in turn the specific SSM security service. Because communication between the custom SSM client and the Web Services SSMs is placed on the network, the custom SSM clients can be located anywhere on the network. Their location is not restricted to the local machine.
- The Admin user uses the administration console to distribute the initial security configuration and all updates over the network. If the Administration Server is disconnected from the Web Services SSMs, the SSMs continue to function.

Figure 1-7 Usage Model



The interaction between the client and the Web Services SSM is as follows (see [Figure 1-7](#)):

1. The client issues a user request that includes the following:
  - A user identity credential (a username/password pair, a signed SAML 1.1 assertion, or ALES cookie)
  - The resource to which the user wants access and the action to be performed
  - The Authentication Service
2. The client queries the local Registry Service to retrieve the fully qualified URL for the endpoint of the authentication service. If the authentication service exists on the local machine, the SSM returns the URL to the client. If it does not exist, the request fails. If the Authentication Service is omitted from the client request, the URL for the default authentication service on the local machine is returned.
3. The web services client calls the Authentication Service, uses the user credentials to authenticate the user. If authentication succeeds, the service returns an identity assertion token that is an internal representation of the user's identity. If the authentication fails, the service returns an AuthenticationFailure SOAP Fault.
4. The client queries the local Registry Service to retrieve the fully qualified URL for the endpoint of the Authorization Service.

5. The Authorization Service and the associated Role Mapping Service determine whether the user has been granted the privileges required to access to the specified resource and perform the requested action. The service answers the question "Is this user allowed to perform the particular action on specified resource?" To make the access decision, the service compares the roles granted to the user to the policy written to protect the requested resource. If none of the user's roles match the roles allowed to access the requested resource, or if the resource does not have any policy to protect it, access is denied.
6. If access is allowed, the user is granted access to the resource and the request is serviced.

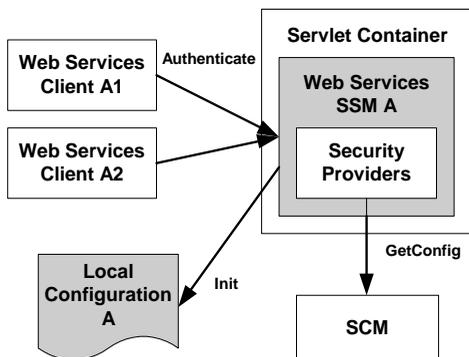
## Product Features

The Web Services Security Service Module (SSM) has the following features:

- **Standalone Deployment**

Each instance of a Web Services SSM is made accessible to clients via a separate SOAP endpoint with a unique URL. Further, each security service is deployed as a separate component inside the hosting process, with each service using disparate configuration entry to identify and initialize itself. [Figure 1-8](#) shows how each Web Services SSM is deployed and initialized in an environment where multiple Web Services SSMs are deployed.

**Figure 1-8 Multiple Web Services SSM Deployments**



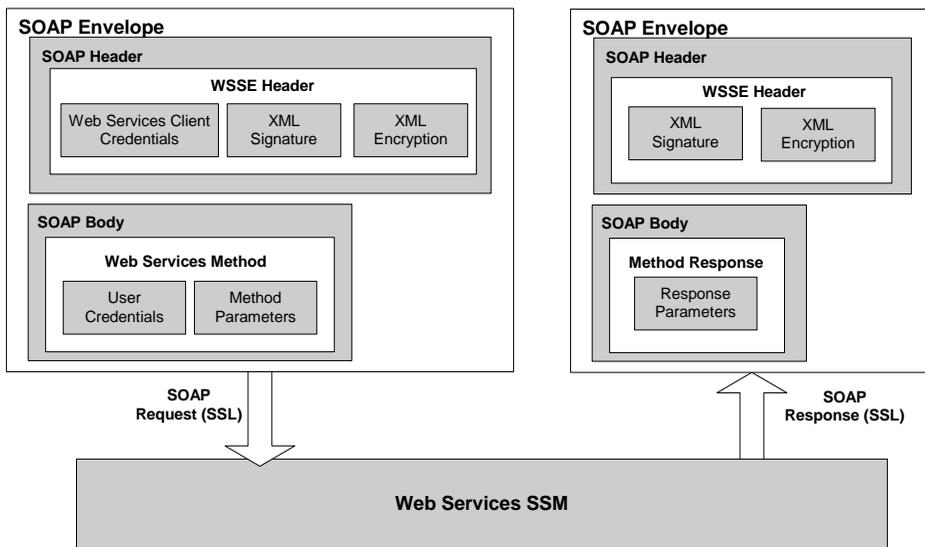
- **Credentials Protection**

Identity assertions must be signed by a trusted entity. An assertion that is not signed or signed by an unknown authority is rejected and the processing stopped. The digital signature is attached to the identity assertion and covers the entire assertion.

- **XML Structures Follow Industry Standards**

The XML structures defined by the OASIS WS-Security Standard v1.0 for passing username/password during client authentication with one-way SSL. See [Figure 1-9](#) for the general format of the SOAP messages exchanged between the web services client and the Web Services SSM.

**Figure 1-9 SOAP Message Format**



- **Secure Web Services security service APIs**

Access to the Web Services SSM security service APIs is restricted to clients that have been authenticated.

- **Channel and message protection**

In order to protect messages in transit, the Web Services SSM supports a channel security protocol (SSL 3.0 or TLS 1.0) for all communication that takes place between the SSM and its clients.

- **Support for one-way and two-way SSL client connections**

The Web Services SSM always authenticates itself to client using its X.509 site certificate.

A client presents its certificate as part of a two-way SSL handshake with the Web Services SSM servlet container. The client's identity, contained in the SSL certificate, is subsequently used for client authentication.

**Note:** For two-way SSL authentication, any certificate authority (CA) used to generate the client certificate must be manually added to the Web Services SSM `peer.jks` keystore.

- **Automatic restart of security services**

The Web Services SSM uses the AquaLogic Enterprise Security process monitoring and management mechanism to automatically restarted a security service if it is found to be unresponsive. Upon restart, the service is initialized using the latest configuration and automatically resumes its normal operation.

- **Event auditing capabilities**

The Web Services SSM relies on the AquaLogic Enterprise Security auditing capabilities to provide a file-based, audit logging facility with configurable audit log filename. Any service or request-related failures produce an audit trail. Additionally, the following Web Service SSM instance lifecycle events produce audit trails:

- Initialization complete, ready to serve requests
- Shutdown initiated
- Restarted after a process crash

- **Configuration stored locally**

The Web Services SSM relies only on the local configuration for its operation. The local configuration includes all necessary information to start-up Web Services SSM process, identify its instance, and set up a two-way SSL connection to the local Service Control Manager (SCM) process.

- **WSDL 1.1**

The Web Services Description Language (WSDL) is an XML-based specification that describes a web service. A WSDL document describes web service operations, input and output parameters, and how a client application connects to the web service.

For more information, see <http://www.w3.org/TR/wsdl>.

# Web Services Interfaces

To develop web services clients, you use the Web Services Security Service Module (SSM) application programming interfaces (APIs) developed by BEA Systems.

These interfaces are described in the following sections:

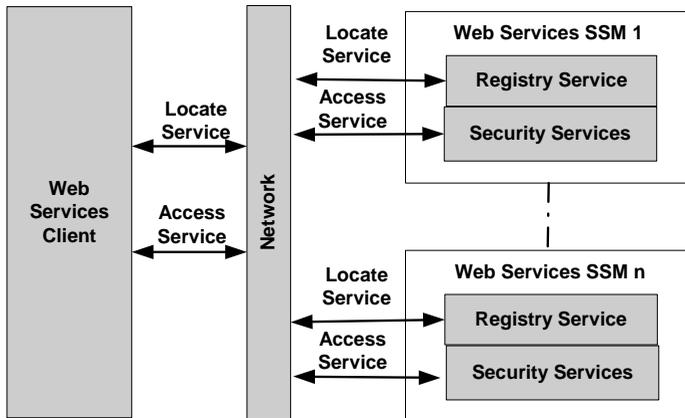
- [“Registry Service Interface” on page 2-1](#)
- [“Methods Common to All Web Services Interfaces” on page 2-4](#)
- [“Authentication Service Interface” on page 2-4](#)
- [“Authorization Service Interface” on page 2-11](#)
- [“Auditing Service Interface” on page 2-16](#)
- [“Role Mapping Service Interface” on page 2-18](#)
- [“Credential Mapping Service Interface” on page 2-21](#)

## Registry Service Interface

To map security service type and SSM configuration and SOAP endpoints, each Web Services SSM process has its own separate Registry Service. The address of the Registry Service should be known to the web services client from its configuration. This service maps the SSM Configuration ID and the service type to the Web Services SSM and SOAP endpoints for the security services. The Configuration ID is defined in the `default.properties` file for the SSM instance. The Registry Service makes it possible to distinguish between the supported service types (auditing, authentication, authorization, credential mapping, and role mapping). Registry

Service operations on a particular machine are limited to the local machine (see [Figure 2-1](#)). The Web Services client learns about the Registry Service from its configuration file.

**Figure 2-1 Registry Service Function**



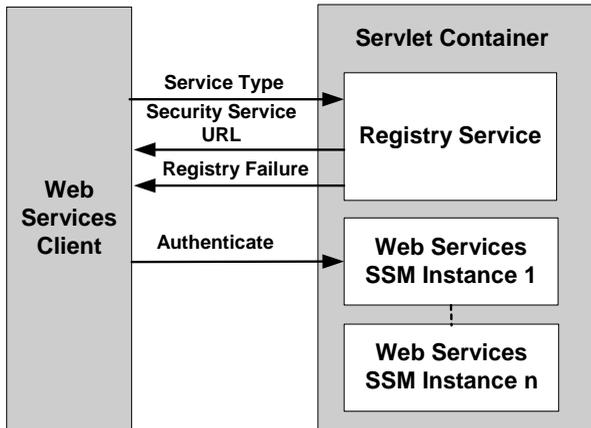
The following topics provide or more information on the Registry Service.

- [“How the Registry Service Works”](#) on page 2-2
- [“Registry Service Methods”](#) on page 2-3

## How the Registry Service Works

The Registry Service works as follows ([Figure 2-2](#)):

Figure 2-2 How the Registry Service Works



1. If a web services client asks the Registry Service about the existence of a particular security service type, the Registry Service responds with a true or false answer.
2. If a web services client asks for the URL of a valid security service type for the local host, the Registry Service returns the fully qualified URL of the endpoint for the requested service type that is provided by the SSM configuration. The Configuration ID is defined in the `default.properties` file.
3. If a web services client asks the registry for a URL for a security service type that has an invalid security service type for Web Services SSM identified by the Configuration ID, the Registry Service returns a RegistryFailure SOAP Fault.

**Note:** The Registry Service does not provide lifecycle management functions for the Web Services.

For more information on the Registry Service interface and the methods it supports, see [WSDLdocs for Web Services Interfaces](#).

## Registry Service Methods

The Registry Service supports two methods: `locateService()` and `doesServiceExist()`. Both methods accept the requested service type of the Web Server SSM or Web Services SSM that provides the service. The supported service types are: `ALES_AUDIT`, `ALES_AUTHENTICATION`, `ALES_AUTHORIZATION`, `ALES_CREDENTIAL`, and `ALES_ROLE`. The type for all service types is `string`.

For the `locateService()` method, the Registry Service returns the fully qualified URL for the endpoint of the requested service. For the `doesServiceExist()` method, the service returns a Boolean value (`true` or `false`) that indicates whether the service exists and can be requested.

## Methods Common to All Web Services Interfaces

The following methods are supported by all Web Services interfaces, except for the Registry Service interface.

- `getServiceType()`—This method takes an empty request and returns a structure that contains the service. The Web Services SSM supports these security service types: `ALES_AUDIT`, `ALES_AUTHENTICATION`, `ALES_AUTHORIZATION`, `ALES_CREDENTIAL`, and `ALES_ROLE`. The type for all service types is `string`.
- `getServiceVersion()`—This method takes an empty request and returns a structure that contains the version of the service. The Web Service SSM supports these version types: `MajorVersion` (type `int`), `MinorVersion` (type `int`), `PatchLevel` (type `string`), and `Version` (type `long`).
- `isCompatible()`—This method accepts service version information and returns compatibility information. The method accept these values: `MajorVersion` (type `int`), `MinorVersion` (type `int`), `PatchLevel` (type `string`), and `Version` (type `long`). It returns these compatibility responses: `ALES_NOT_COMPATIBLE`, `ALES_COMPATIBLE`, `ALES_COMPATIBLE_DEPRECATED`, `ALES_COMPATIBLE_UNKNOWN`. All compatibility responses are returned as strings. You use this method to determine whether the version of the service interface specified in the web services client is compatible with the current version of the service interface in the instance of the Web Services SSM.

## Authentication Service Interface

The Authentication Service provides security functions to an application so as to establish, verify, and transfer a person or process identity. Thus, the Authentication Service provides two main security functions: authentication and identity assertion.

The Authentication Service accepts user credentials and/or identity assertion tokens and verifies that they match the user identity stored in the existing user profile. The following types of identity assertion tokens are supported:

- Username/password
- Signed Security Assertion Markup Language (SAML) 1.1 assertions
- ALES cookie

The Extensible Markup Language (XML) structures used by the Authentication Service for transmitting identity assertion tokens and other credential types are defined the WSDL interface.

To ensure secure handling of credentials, all credentials presented to the Web Services Security Service Module must satisfy the following requirements:

- All SAML 1.1 identity assertions must be signed by a trusted entity, as determined by the SAML IdentityAsserter. The signature must be attached to the identity assertion and cover the entire assertion. An identity assertion that is not signed or signed by an unknown authority is rejected and the processing is stopped.
- The caller should verify the validity of server credentials prior to invoking the Web Service. In particular, the caller should verify its validity by examining its expiration date, certification path, and revocation status.

The Web Services SSM only accepts clear-text passwords. However, the credentials presented are always be protected by SSL, either one-way or two-way. The Web Services SSM returns credentials to clients over SSL as well.

The SOAP authentication interface enables the Web Services SSM to return challenges to clients if they fail to provides the information necessary to complete the authentication process. In such cases, the client can respond with the requested information. In order to avoid expensive round trips, however, the web services client should pass in all available credentials information with the initial SOAP request.

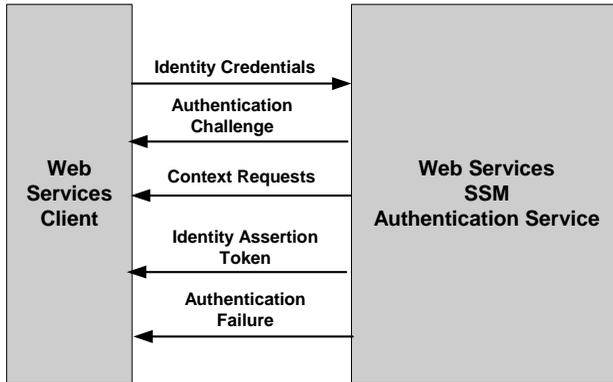
The following topics provide more information on the Authentication Service interface:

- [“Authentication Process” on page 2-5](#)
- [“Authentication Service Methods” on page 2-7](#)

## Authentication Process

The authentication process is as follows (see [Figure 2-3](#)):

**Figure 2-3 Authentication Service Process**



1. The web services client connects to the Web Services SSM over HTTP and the Web Services SSM responds by presenting a digital certificate to prove its identity to the client. The Web Services SSM authenticates itself to the web services client using its server X.509 certificate. If the Web Services SSM presents a certificate that is not valid (for instance, the certificate has expired or has a subject name mismatch), the client should break the connection.
2. The web services client verifies the SSMs digital certificate and submits a certificate signed by a recognized certificate authority (CA) to the Web Services SSM.
3. The Web Services SSM verifies the clients certificate and establishes an SSL connection.
4. The web services client submits credentials to Web Services SSM to login. Web services clients present user credentials with each login request. Use credential can be username/password, a SAML assertion, or an ALES cookie
5. The Authentication Service verifies the client credentials.
6. If the credentials authenticate, the Authentication Service returns an identity assertion token to the web services client.
7. If the credentials do not authenticate, the Authentication Service submits the credentials for checking. The Authentication Service does one of two things:
  - Validates the user credentials, grants the login, and returns a success message to the Web Services SSM.
  - Invalidates the user credentials, blocks the login, and returns a failure message to the Web Services SSM.

8. If an authentication decision cannot be made with the parameters included in the initial client request, the request fails.
9. If authentication is successful, the Web Services SSM returns the default identity assertion token representing the user. The type of the default identity assertion token is configurable. If the type is not specified, SAML assertions are used.
10. If authentication fails, the Web Services SSM returns an `AuthenticationFailure` SOAP Fault to the caller.

For more information on the Authentication Service Interface and the methods it supports, see [WSDLdocs for Web Services Interfaces](#).

## Authentication Service Methods

To support authentication functions the authentication provides the following methods:

- [“authenticate\(\) Method” on page 2-7](#)
- [“assertIdentity\(\) Method” on page 2-8](#)
- [“isAssertionTokenSupported\(\) Method” on page 2-9](#)
- [“validateIdentity\(\) Method” on page 2-10](#)

### authenticate() Method

This method accepts any credential type supported by the authentication provider or a response to an earlier authentication challenge, and, optionally, the type of requested identity assertion that represents the identity and application context of the authenticated user. In response, it returns either the requested identity assertion token and status information or an authentication challenge.

**Note:** In addition to the identity assertion types, the Web Services SSM supports user credentials in form of usernames with passwords.

[Table 2-1](#) describes the `authenticate()` method parameters.

**Table 2-1** `authenticate()` Method Parameters

Parameter	Description	Supported Values/Types
<b>Input Parameters</b>		
Identity Credential	Specifies the identity credential that is to be used to authenticate the caller.	<code>ssm:IdentityCredentialType</code>

**Table 2-1 authenticate() Method Parameters (Continued)**

Parameter	Description	Supported Values/Types
RequestCredentialType	Specifies the identity credential type.	ssm:CredentialTypeType
AppContext	Specifies the application context in which authentication is being requested.	ssm: "ContextType" Where ssm:ContextType can be one of the following: StringValue/string, BoolValue/boolean, DateTimeValue/dateTime, TimeValue/time, IntValue/integer IpValue/ssm:IpType
<b>Return Parameters</b>		
IdentityAssertion	Returns the identity assertion token.	type="ssm:IdentityAssertionType"
Challenge	Returns an authentication challenge to the caller.	type="ssm:ChallengeType"
StatusInfo	Returns status information.	type="xsd:string"

## assertIdentity() Method

This method accepts any supported identity assertion type or a response to an earlier authentication challenge, and, optionally, the type of requested identity assertion that represents the identity and application context of the authenticated user. In response, it returns either the requested identity assertion token and status information or an authentication challenge.

[Table 2-2](#) describes the `assertIdentity()` method parameters.

**Table 2-2 assertIdentity() Method Parameters**

Parameter	Description	Supported Values/Types
<b>Input Parameters</b>		
IdentityAssertion	An identity assertion token that represents the authenticated identity of the user.	type="ssm:IdentityAssertionType"
RequestedCredentialType	Specifies the type of credential being submitted for authentication.	type="ssm:CredentialTypeType"
AppContext	Specifies the application context in which authentication is being requested.	ssm:ContextType <b>Where</b> ssm:ContextType can be one of the following: StringValue/string, BoolValue/boolean, DateTimeValue/dateTime, TimeValue/time, IntValue/integer IpValue/ssm:IpType
<b>Return Parameters</b>		
IdentityAssertion	Returns the identity assertion token.	An acceptable user's identity assertion token.  type="ssm:IdentityAssertionType"
Challenge	Returns an authentication challenge to the caller.	type="ssm:ChallengeType"
StatusInfo	Returns status information.	type="xsd:string"

## isAssertionTokenSupported() Method

This method accepts an identity assertion credential type that represents the authenticated user's identity. It returns a Boolean value (`true` or `false`) to indicate whether this token type is supported by this instance of the Web Services SSM.

[Table 2-3](#) describes the `isAssertionTokenSupported()` method parameters.

**Table 2-3 isAssertionTokenSupported() Method Parameters**

Parameter	Description	Supported Values/Types
<b>Input Parameter</b>		
Assertion CredentialType	Specifies the identity assertion credential type. The type specified can be any type supported by the ALES Credential Mapping provider. The Authentication Service may also return an authentication challenge to the caller requesting other assertion token types. If the caller fails to specify an assertion token type supported by the Authentication Service even after challenges, the Authentication Service returns CredentialMappingFailure to the caller.	AssertionCredentialType type="ssm:CredentialTypeType"
<b>Return Parameter</b>		
isAssertionToken SupportedResponse	Specifies whether the assertion token is supported.	true/false type="xsd:boolean"

### validateIdentity() Method

This method accepts any supported identity assertion type that represents the identity of the authenticated user. It returns a structure with a Boolean value (`true` or `false`) that indicates whether the token is valid.

Table 2-4 describes the `validateIdentity()` method parameter.

**Table 2-4 validateIdentity() Method Parameters**

Parameter	Description	Supported Values/Types
<b>Input Parameter</b>		
IdentityAssertion	An identity assertion token that represents the authenticated identity of the user.	IdentityAssertion type="ssm:IdentityAssertionType"
<b>Return Parameter</b>		
validateIdentityResponse	Specifies whether the identity is valid.	true/false type="xsd:boolean"

## Authorization Service Interface

The Authorization Service is a service that allows an application to determine if a specific identity is permitted to access a specific resource. This decision may then be enforced in the application directly at the policy enforcement point.

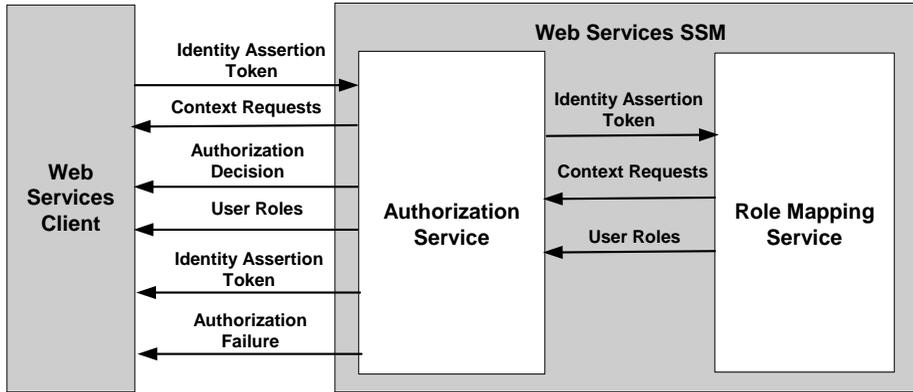
The Authorization Service is primarily based on a single method: `isAccessAllowed()`. This method accepts a supported type of user credential or an identity token, a runtime resource, and a runtime action. Optionally, this method can accept the type of the requested identity assertion token that represents the identity of the authenticated user, the application context, and direction parameters. The `isAccessAllowed()` method requires that a valid, authenticated identity or a null identity token (representing an anonymous identity) be present when requesting an access decision. The following topics provide more information on the Authorization Service.

- [“Authorization Process” on page 2-11](#)
- [“Authorization Service Methods” on page 2-13](#)

## Authorization Process

The authorization process is as follows (see [Figure 2-4](#)):

**Figure 2-4 Authorization and Role Mapping Process**



1. The authorization process begins when the web services client calls the Web Services SSM to answer the question "Is this user allowed to perform this particular action on the specified resource?" Identity assertion token types supported include ALES cookies and signed SAML 1.1 assertions.
2. If the token matches a credential in the cache, the SSM sets the user identity to the internal identity representation, which includes the user identity and the list of roles the user has been granted.
3. If the token does not match any of the credentials in the cache, the SSM calls the Authorization Service and the Role Mapping Service to determine whether the user is authorized to access resources and to get the list of roles the user has been granted. If the user is authorized, the user identity is set to the internal identity representation, which includes the user identity and the list of roles the user has been granted.
4. The Authorization Service then compares the user identity to the resource security policy to determine whether the user is in a role that has been granted the access privilege that is necessary to perform the requested action on the particular resource.
5. If an authorization decision can not be made with the parameters included in the initial client request, the Authorization Service returns a context request to the web services client indicating which parameters are missing.
6. The web services client must fill in the application context with the required parameters and re-submit the request. The Web Services SSM supports six context types: `StringValue`, `BoolValue` type, `DateTimeValue`, `TimeValue`, `IntValue`, and `IpValue`.

7. If the authorization process fails due to parameter-related problems, an `AuthorizationFailure` SOAP Fault is returned to the caller.
8. In the absence of an error, the authorization decision that is returned to the web services client contains a clear and unambiguous true or false statement that allows or disallows access to the resource in question. A negative authorization decision is a valid result and does not result in a SOAP Fault.

For more information about the Authorization Service interface, see the [WSDLdocs for Web Services Interfaces](#).

## Authorization Service Methods

The Authorization Service supports the following methods:

- “[isAccessAllowed\(\)](#)” on page 2-13
- “[isAuthenticationRequired\(\) Method](#)” on page 2-15

### isAccessAllowed()

This method accepts a supported type of an identity assertion token and runtime resource and action structures. Optionally, it can accept the requested identity assertion credential type, application context, and authorization direction parameters. In response, this method returns the authorization decision and authorization data, or, if required by the authorization provider, additional context requests.

[Table 2-5](#) describes the `isAccessAllowed()` method parameters.

**Table 2-5 isAccessAllowed() Method Parameters**

Parameter	Description	Supported Values/Types
<b>Input Parameters</b>		
<code>IdentityAssertion</code>	An identity assertion token that represents the authenticated identity of the user. The token type must be supported by the ALES Credential Mapping provider; otherwise, the service returns <code>CredentialMappingFailure</code> to the caller.	<code>IdentityAssertion/</code> <code>ssm:IdentityAssertionType</code>

**Table 2-5 isAccessAllowed() Method Parameters (Continued)**

Parameter	Description	Supported Values/Types
RuntimeResource	Specifies the runtime resource that the caller is requesting.	ResourceString, AuthorityName  type="ssm:RuntimeResourceType"
RuntimeAction	Specifies the runtime action that the caller is requesting.	ActionString, AuthorityName  type="ssm:RuntimeActionType"
RequestCredentialType	Specifies the identity assertion credential type. The type specified can be any type supported by the ALES Credential Mapping provider. The Authentication Service may also return an authentication challenge to the caller requesting other assertion token types. If the caller fails to specify an assertion token type supported by the Authentication Service even after challenges, the Authentication Service returns <code>CredentialMappingFailure</code> to the caller.	AssertionCredentialType/ ssm:CredentialTypeType
AppContext	Specifies the application context in which access to the resource is being requested.	ssm: "ContextRecordType"  <b>Where</b> ssm:ContextRecordType is one of the following: StringValue/string, BoolValue/boolean, DateTimeValue/dateTime, TimeValue/time, IntValue/integer IpValue/ssm: IpType
AtzDirection	Specifies authorization direction parameters.	ALES_ONCE, ALES_POST, ALES_PRIOR  type="ssm:AtzDirectionEnum"

**Table 2-5 isAccessAllowed() Method Parameters (Continued)**

Parameter	Description	Supported Values/Types
<b>Return Parameters</b>		
isAccessAllowed Response	Indicates whether access is allowed.	true/false type="xsd:boolean"
AtzDecisionData	Information about the access decision.	type="ssm:AtzDecisionData Type"
"ContextRequests"	Requests additional context if required by the ASI Authorization provider.	type="ssm:ContextRequestsType"

## isAuthenticationRequired() Method

The Authorization Service interface also supports the `isAuthenticationRequired()` method. This method accepts a runtime resource and a runtime action. It returns a Boolean value (`true` or `false`) that indicates whether authentication is required to access this resource. The web services client uses this method to test whether privileges are required to access a particular resource.

[Table 2-6](#) describes the `isAuthenticationRequired()` method parameters.

**Table 2-6 isAuthenticationRequired() Method Parameters**

Parameter	Description	Parameter Values/Types
<b>Input Parameters</b>		
RuntimeResource	Specifies the runtime resource that the caller is requesting.	ResourceString, AuthorityName type="ssm:Runtime ResourceType" /
RuntimeAction	Specifies the runtime action that the caller is requesting.	ActionString, AuthorityName type="ssm:Runtime ActionType"
<b>Return Parameter</b>		
isAuthentication RequiredResponse	Indicates whether authentication is required.	true/false type="xsd:boolean"

## Auditing Service Interface

The Auditing Service logs events based on activity related to enterprise security. The Web Services Security Service Module (SSM) runtime uses the Auditing Service to log appropriate data when events occur. The Auditing Service is based on an event model. When something of note occurs, an auditing event is automatically logged. A user or an application that wants notification when a particular event occurs can derive a new class from the `AuditRecord` class.

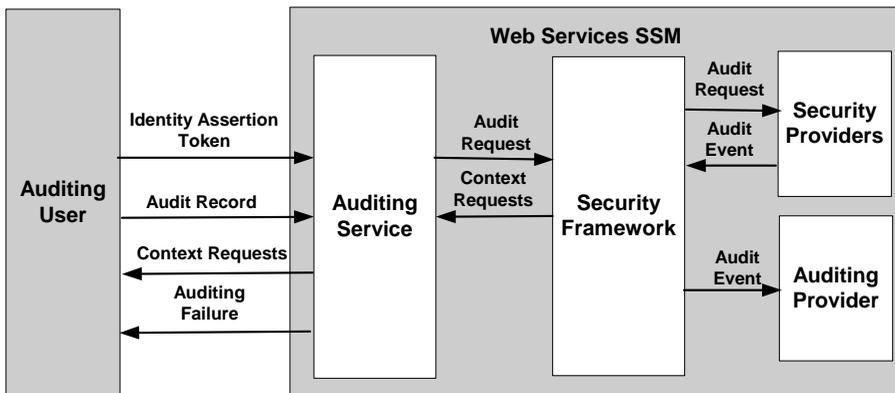
The following topics provide more information on the Auditing Service.

- “Auditing Process” on page 2-16
- “Auditing Service Method” on page 2-17

## Auditing Process

The auditing process is as follows (see Fig):

Figure 2-5 Auditing Process



1. During the auditing process, the Web Services SSM audit logging function supports automated, centralized logging of audit messages. To capture a particular event for notification purposes an auditing user can use the `recordEvent()` method to specify the name of the audit record to be captured, and, optionally, the identity assertion token of the auditing user, and the application context.
2. If the auditing provider requires application context that is not included in the `recordEvent()` method, the Auditing Service returns requests for additional application context.

3. If parameter-related audit logging failures occur, including passing in an invalid identity assertion token for the user, an `AuditingFailure` SOAP Fault is returned to the caller.
4. If no errors occur during the auditing process, an empty response is returned to the auditing user as an event notification and the audit event is logged by the auditing provider.

For more information on the Auditing Service interface and the methods it supports, see [WSDLdocs for Web Services Interfaces](#).

## Auditing Service Method

The Auditing Service passes the audit event to the Web Services SSM runtime. Based on its configuration, the SSM runtime routes the event to the proper auditing providers so that it can be recorded.

The Auditing Service supports a single method, `recordEvent()`. This method accepts an audit record, and, optionally, an identity assertion token, representing the auditing user, and an application context.

[Table 2-7](#) describes the `recordEvent()` method parameters.

**Table 2-7** `recordEvent()` Method Parameters

Parameter	Description	Supported Values/Types
<b>Input Parameters</b>		
<code>AuditRecord</code>	Specifies the type of the audit record that encapsulates the logging information.	<code>type="ssm:AuditRecordType"</code>

**Table 2-7 recordEvent() Method Parameters**

Parameter	Description	Supported Values/Types
IdentityAssertion	An identity assertion token that represents the authenticated identity of the auditing user.	type="ssm:IdentityAssertionType"
AppContext	Specifies the application context in which request for an auditing record is being made.	ssm:ContextType  Where ssm:ContextType can be one of the following: StringValue/string, BoolValue/boolean, DateTimeValue/dateTime, TimeValue/time, IntValue/integer IpValue/ssm:IpType

## Role Mapping Service Interface

The Role Mapping Service allows an application to extract role information about specific identities and resources within the context of the application. These roles can then be used for customizing an interface or for other purposes.

**Note:** Do not use roles by themselves for authorization, because many policies, allowing or disallowing access to a resource, may be written against a role. Use the Authorization Service to determine actual access rights.

The Role Mapping Service evaluates an interaction of an identity with a resource within an application context and returns a list of role names associated with the configuration of that identity. These roles can change with every resource or be static for the identity across all resources. The roles assigned to an identity are determined by the security policy.

The Web Services SSM is capable of retrieving the roles that a user may have for the given resource and action combination. The user identity is passed as an identity assertion token, instead of a Java object. To obtain roles, authenticated users must be authorized to obtain their roles for the given resource/action combination.

The Role Mapping Service requires that the application pass in a valid identity, a valid resource, and a valid action. The application context is optional and may be set to null if no context is passed in.

The following topics provide more information on the Role Mapping Service.

- [“Role Mapping Process”](#) on page 2-19
- [“Role Mapping Service Method”](#) on page 2-19

## Role Mapping Process

The role mapping process is as follows (see [Figure 2-4](#)):

1. During the role mapping process, the Web Services SSM provides a mechanism for optionally specifying the application context to support role mapping.
2. If parameter-related role mapping failures occur, including passing in an invalid identity assertion token for the user, a `RoleMappingFailure` SOAP Fault is returned to the caller.
3. If no errors occur during the role mapping process, a list of zero or more roles, configured in the policy for the provided user/resource/action combination, is returned to the caller. An empty list is a valid response and does not result in a SOAP Fault.

For more information on the Role Mapping Service interface and the methods it supports, see [WSDLdocs for the Web Services Interfaces](#).

## Role Mapping Service Method

The Role Mapping Service interface supports one method, `getRoles()`. This method gets the roles for an authenticated user identity in reference to a `RuntimeResource`, `RuntimeAction`, and an optional `Context`.

The `getRoles()` method accepts a supported type of an identity token, and, optionally, runtime resource and action structures, and an application context. It returns either a list of user roles associated for the identity and a time-to-live parameter for user roles.

[Table 2-8](#) describes the `getRoles()` method parameters.

**Table 2-8 getRoles Method Parameters**

Parameter	Description	Supported Values/Types
<b>Input Parameters</b>		
IdentityAssertion	An identity assertion token that represents the authenticated identity of the user. The token type must be supported by the Role Mapping provider; otherwise, the service returns RoleMappingFailure to the caller.	IdentityAssertion type="ssm:IdentityAssertionType"
RuntimeResource resource	Specifies the runtime resource that the caller is requesting.	ResourceString, AuthorityName type="ssm:RuntimeResourceType"
RuntimeAction action	Specifies the runtime action that the caller is requesting.	ActionString, AuthorityName type="ssm:RuntimeActionType"
AppContext	Specifies the application context in which access to the resource is being requested.	type="ssm:ContextType"  Where ssm:ContextType can be one of the following: StringValue/string, BoolValue/boolean, DateTimeValue/dateTime, TimeValue/time, IntValue/integer IpValue/ssm:IpType
<b>Return Parameters</b>		
Roles	Specifies a list roles granted to the user.	type="ssm:IdentityRoleType"
RolesTtlAdvice	Specifies time to live for user roles.	type="xsd:positiveInteger"

## Credential Mapping Service Interface

The Credential Mapping Service allows an client application to fetch credentials of certain types that are associated with a specific identity for a specific resource. These credentials can then be used on behalf of that identity to execute some privileged function, such as logging into a database or sending e-mail.

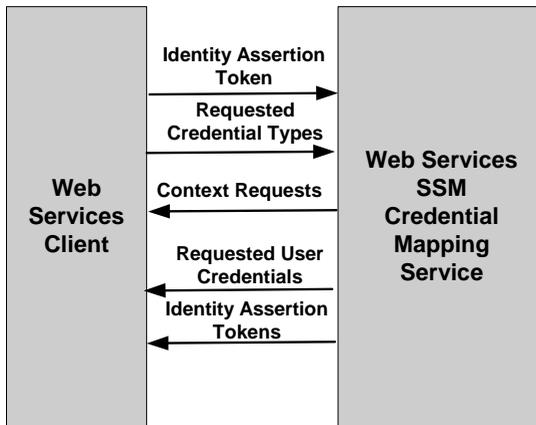
The following topics provide more information on the Credential Mapping Service.

- “Credential Mapping Process” on page 2-21
- “Credential Mapping Method” on page 2-22

## Credential Mapping Process

The credential mapping process is as follows (see [Figure 2-6](#)):

**Figure 2-6 Credential Mapping Process**



1. The client presents a get credentials request to the Web Services SSM. The request includes a supported type of an identity assertion token and a list of requested credential types. Optionally, the request can include a runtime resource, runtime action, and an application context.
2. In response, the Web Services SSM returns a list of requested user credentials and identity assertion tokens or, if required by the Credential Mapping provider, additional context requests.

3. The Web Services SSM returns the following types of credentials in response to the client's request:
  - Username/password pairs
  - Signed SAML 1.1 assertions
  - ALES cookies
4. If parameter-related credential mapping failures occur, the Web Service returns a `CredentialMappingFailure` SOAP Fault to the caller.
5. If no errors occur during the credential mapping process, the Web Services SSM returns a list of zero or more credentials that are configured in the security policy for the specified user/resource/action combination. An empty list is a valid response and does not result in a SOAP Fault. Also, if some of the requested credential types are not available for specified user/resource/action combination, a SOAP Fault does not result.

For more information on the Credential Mapping Service interface and the methods it supports, see WSDLdocs [for Web Services Interfaces](#).

## Credential Mapping Method

The Credential Mapping Service supports one method: `getCredentials()`. This method accepts a supported type of an identity assertion token and a list of requested credential types. Optionally, this method can accept an identity assertion token that represents the identity of a different user and a runtime resource structure, which includes the requested resource and action and the application context. In response, the `getCredentials()` method returns either a list of requested user credentials, identity assertion tokens, and a list of any missing credential types.

**Note:** Since password credentials need to be returned in clear text to the caller in order to be usable for authentication in external systems, you should pay particular attention to providing channel and message security to protect messages in transit between clients and the Web Service. At a minimum, you must use a channel security protocol, such as SSL or TLS, for all communication.

Authenticated users are always authorized to obtain their own credentials for the given resource/action combination. However, authenticated user cannot requests credentials on behalf of another user.

Credential mapping process involves issuing new types of credentials to the specified combination of user, resource, and action. The user identity is passed as an identity assertion token, instead of a Java object.

[Table 2-9](#) describes the `getCredentials()` method parameters.

**Table 2-9 getCredentials Method Parameters**

Parameter	Description	Supported Values/Types
<b>Input Parameters</b>		
IdentityAssertion	An identity assertion token that represents the authenticated identity of the user. The type used must be supported by the ALES Credential Mapping provider; otherwise, the service returns <code>CredentialMappingFailure</code> to the caller.	IdentityAssertion ssm: "IdentityAssertionType"
RequestedCredentialTypes	Specifies a list of the types of credentials being requested. The Web Services SSM supports the following types of credentials: <ul style="list-style-type: none"> <li>Username/password pairs</li> <li>Signed SAML 1.1 assertions</li> <li>ALES proprietary cookie</li> </ul>	type=" ssm:CredentialTypesType" Any non-empty string consisting of any number of alphanumeric characters and these separators: period (“.”), comma (“,”), and underscore (“_”).
RuntimeResource	Specifies the runtime resource that the caller is requesting.	ResourceString, AuthorityName type=" ssm:RuntimeResourceType"
RuntimeAction	Specifies the runtime action that the caller is requesting.	ActionString, AuthorityName type=" ssm:RuntimeActionType"
AppContext	Specifies the application context in which access to the resource is being requested. Specified as a name/value pair.	ssm: "ContextType" Where <code>ssm:ContextType</code> can be one of the following: StringValue/string, BoolValue/boolean, DateTimeValue/dateTime, TimeValue/time, IntValue/integer IpValue/ssm:IpType

**Table 2-9 getCredentials Method Parameters (Continued)**

Parameter	Description	Supported Values/Types
<b>Return Parameters</b>		
MissingTypes	List of missing credential types.	type="xsd:string"
Identity Credential	List of user credentials.	type="ssm:IdentityCredentialType"
IdentityAssertion	Identity assertion tokens that represent the authenticated identity of the user.	IdentityAssertion type="ssm:IdentityAssertionType"