# Oracle® Communications Service Broker

Security Guide

Release 6.1

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Oracle Communications Service Broker Security Guide, Release 6.1

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# Preface

This document describes the Oracle Communications Service Broker (Service Broker) security features and procedures.

## Audience

This document is intended for system administrators and system integrators who install and configure Service Broker, and integrate it with existing telecom networks, and developers who will add features and capabilities to Service Broker.

## Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc`.

### Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info` or visit `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs` if you are hearing impaired.

## Related Documents

For more information, see the following documents in the Oracle Communications Release 6.1 documentation set:

- *Oracle Communications Service Broker Concepts Guide*
- *Oracle Communications Service Broker Installation Guide*
- *Oracle Communications Service Broker System Administrator's Guide*
- (Optional) Oracle Communications Service Broker Policy Controller Implementation Guide
- (Optional) Oracle Communications Service Broker Online Mediation Controller Implementation Guide.
- Oracle Communications Service Broker VPN Implementation Guide
- Oracle Communications Service Broker Social Voice Communicator Implementation Guide

Oracle documentation is available from Oracle Technology Network:

http://docs.oracle.com

## Downloading Oracle Communications Documentation

Oracle Communications Service Broker documentation is available from the Oracle software delivery Web site:

http://edelivery.oracle.com/

Additional Oracle Communications documentation is available from Oracle Technology Network:

http://www.oracle.com/technetwork/index.html

# 1

# Service Broker Security Overview

This chapter provides an overview of how to configure and manage security for Oracle Communications Service Broker (Service Broker).

## Basic Security Considerations

The following principles are fundamental to using any application securely:

- **Keep software up to date**. This includes the latest product release and any patches that apply to it.
- **Limit privileges as much as possible**. Users should be given only the access necessary to perform their work. User privileges should be reviewed periodically to determine relevance to current work requirements.
- **Monitor system activity**. Establish who should access which system components, and how often, and monitor those components.
- **Install software securely**. For example, use firewalls, secure protocols such as SSL and secure passwords.
- **Learn about and use the Service Broker security features**. See these sections for details:
  - Configuring Security between Service Broker Components in *Oracle Communications Service Broker System Administrator's Guide*.
  - Securing Credentials with Credential Store in *Oracle Communications Service Broker System Administrator's Guide*.
- **Use secure development practices**. For example, take advantage of existing database security functionality instead of creating your own application security. See "Implementing Service Broker Security" for more information.
- **Keep up to date on security information**. Oracle regularly issues security-related patch updates and security alerts. You must install all security patches as soon as possible. See the "Critical Patch Updates and Security Alerts" Web site:

  `http://www.oracle.com/technetwork/topics/security/alerts-086861.html`

## Overview of Service Broker Security

Service Broker relies on these lines of defense against malicious attacks:

- High-level protection from the individual protocols that it supports. The "Implementing Service Broker Security" chapter goes into details on how to set up protocol-specific security features.

- Low-level (packet-based) protection using firewalls that you select, obtain, and configure to use with Service Broker. Every Service Broker implementation is different and must assess and obtain firewalls that meet you implementation's needs.
- Service Broker's built-in security features, such as configurable password strength, and native keystores and truststores for storing credentials. See "Implementing Service Broker Security" for details on how to implement these features.
- The policies and procedures that you put in place for configurable software security. This chapter provides some guidance in for these policies and procedures, but every Service Broker implementation is different and must consult your security expert for the best way to completely secure yours.

## Oracle Security Documentation

To implement security, Service Broker uses other Oracle products, such as an Oracle Database. See the following documents for more information:

- *Oracle Database Security Guide*
- *Oracle Database Advanced Security Administrator's Guide*
- *Billing and Revenue Management System Administrator's Guide*
- *Oracle Coherence Release 3.7 Developer's Guide*, section *Operational Configuration Elements*
- *Oracle Coherence Security Guide*

## Understanding the Service Broker Environment

When planning your Service Broker implementation, consider the following:

- Which resources need to be protected?
  - You must protect customer data, such as credit-card numbers.
  - You must protect internal data and traffic, such as billing event traffic.
  - You must protect system components from being disabled by external attacks or intentional system overloads
- Who are you protecting data from?

  For example, you must protect your subscribers' data from other subscribers, but someone in your organization might needs to access that data to manage it. You can analyze your workflows to determine who needs access to the data; for example, perhaps a system administrator can manage your system components without needing to access the system data
- What will happen if protections on a strategic resources fail?

  In some cases, a fault in your security scheme is nothing more than an inconvenience. In other cases, a fault might cause great damage to you or your customers. Understanding the security ramifications of each resource will help you protect it properly.

# 2

# Implementing Service Broker Security

This chapter describes the security model for Oracle Communications Service Broker (Service Broker) and explains how to configure it.

## About the Service Broker Security Model

Service Broker is a flexible product designed to community with a wide variety of other network nodes and applications. Consequently the there are also a wide variety of security concerns when dealing with Service broker security that explained in "Implementing Service Broker Securely".

This chapter assumes that you have already installed the operating system required by Service Broker, and then installed Service Broker itself. For details see *Service Broker Installation Guide*.

By default Service Broker is configured to be as secure as possible. If you disabled any of these security settings to create a test and evaluation system, be sure enable them before starting a productions implementation

## Implementing Service Broker Securely

This section describes recommended deployment configurations for a secure Service Broker implementation. Configure Service Broker security with these steps:

1. Install the operating system that Service Broker runs on.

   The first step in creating a Service Broker implementation is to install the operating system it runs on. See your operating system documentation for instructions on how to install it securely. Also see "Basic Security Considerations"

2. Install Service Broker.

   See *Service Broker Installation Guide* for details on installation. By default Service Broker is configured to be as secure as possible. You may have disabled these security settings when you created a test and evaluation system. Be sure enable the security settings before starting a productions implementation.

3. Change the default ports. See "Changing Default Ports" for details.

4. Maintain a high level of password security. See "Configuring Password Security" for details.

5. Secure the connection between the Administration Console and the Administration Server. See "Securing the Administration Console Connection" for details.

6. (As needed) Secure clusters. See "Securing Clusters" for details.

7. Configure domain security settings with the Service Broker properties files. See "Configuring Domain Security" for information.
8. Secure the Service Broker Managed Servers. See "Securing Administration Clients and Managed Servers" for details.
9. Enable SSL security for HTTP connections. See "Enabling and Disabling SSL" for details.
10. Set up a Public Key Infrastructure to store SSL/TLS credentials. See "Setting Up the Service Broker Public Key Infrastructure" for information.
11. (As needed) Set up Credential Store for storing non-keystore credentials. See "Setting Up a Credential Store" for information.
12. Set up telecom protocol traffic security. See "Setting Up Network Communication End Points" for details.
13. Configure your Service Broker network entry points, routing, and aliases (IMs, OE, and SSUs). See "Setting Up Network Communication End Points" for details.
14. Configure your server firewalls. See "Securing Service Broker with Firewalls" for details.
15. (As needed) Configure protocol security support. See "Securing Network Traffic with Protocol-Specific Security" for details.
16. (As needed) Secure the Service Broker Network Applications. See "Securing the SVC Feature" and "Securing the VPN Feature" for details.
17. Secure network traffic communication. See "Securing Network Communication" for details.
18. (As needed) Set up event monitoring. See "Monitoring Service Broker Events" for details.
19. Configure security for other Oracle products. See "Related Documents" for details.

These steps are explained in the sections that follow.

## Changing Default Ports

After installing Service Broker be sure to change all the default ports, and continue doing so as you complete the post installation steps listed in *Service Broker Installation Guide*.

Table 2–1 lists the default server port numbers that Service Broker uses by default and where to change them.

***Table 2–1 Service Broker Default Server Ports***

| Component/Protocol | Port Number | Description |
|---|---|---|
| Administration Console (Web) | 9001 for HTTPS<br>9000 for HTTP | Set in the **hosting.properties** and **admin.properties** property files. See "Securing the Administration Port" for details. Also see the system administrator's reference in *Service Broker System Administrator's Guide* for details. |
| Policy Designer Interface | 8091 for HTTPS<br>8090 for HTTP | Set in the **oracle.ocsb.app.rcc.pcrf.gui.port** or **pcrf.gui.http.port.secure** system properties. For details see the discussion on configuring Service Broker for Policy Controller in *Service Broker Policy Controller Implementation Guide*. |

*Table 2–1 (Cont.) Service Broker Default Server Ports*

| Component/Protocol | Port Number | Description |
|---|---|---|
| Admin Port (for Administrator Console to Managed Server communication) | 8901 for HTTPS<br>8900 for HTTP | Set in the **Admin Port** entry when creating a Managed Server. For details see the discussion on post installation tasks in *Service Broker Installation Guide*. |
| Managed Server JMX JRMP port | 10003 | Set in the **JMX JRMP port** entry when creating a Managed Server. For details see the discussion on post installation tasks in *Service Broker Installation Guide* |
| JMX Registry port | 10103 | Set in the **JMX Registry port** entry when creating the Managed Server. For details see the discussion on post installation tasks in *Service Broker Installation Guide* |
| Log4J socket server port | 4096 | The **common.properties** property file. See the system administrator's reference in *Service Broker System Administrator's Guide* for details. |
| IP Multicast port | 1024 | Set in the **common.properties** property file. See the system administrator's reference in *Service Broker System Administrator's Guide* for details. |
| Multicast Port | 1025 | The **common.properties** property file. See the system administrator's reference in *Service Broker System Administrator's Guide* for details. |
| Profile Database Server IP | 1521 | Set in SSU WEB SERVICES. For details see the discussion on enabling subscriber profile service connectivity in *Service Broker Subscriber Store User's Guide*. |
| Diameter | 3588 | Set in the SSU DIAMETER. For details see the discussion on configuring Diameter signaling server units in *Service Broker Signaling Server Units Configuration Guide*. |
| Radius | 1812-Authentication<br>1813-Accounting | You set a range of NAS ports to use in the Radius SSU. For details see the discussion on configuring RADIUS signaling server units in *Service Broker Signaling Server Units Configuration Guide*. |
| HTTP | None | Set in SSU WEB SERVICES. For details see the discussion on configuring the web services signaling server units in *Service Broker Signaling Server Units Configuration Guide*. |
| SMPP | None | Set in the SSU SMPP. For details see the discussion on configuring SMPP signaling server units in *Service Broker Signaling Server Units Configuration Guide*. |
| SS7 | None | Set in one of the SS7 SSU, depending on the SS7 protocol used. For details see the discussion on configuring the SS7 Signaling Server Unit for your protocol in *Service Broker Signaling Server Units Configuration Guide*. |
| SIP | 5060 | Set in the SIP SSU. For details see the discussion on configuring SIP signaling server units in *Service Broker Signaling Server Units Configuration Guide* |

### Securing the Administration Port

Configuration and deployment updates are propagated to processing servers and signaling servers over the administration port defined for the server. Oracle recommends that you secure the administration port with SSL encryption and to have client authentication enabled. Do this by setting the **axia.ssl** domain properties to **true**.

The property **axia.admin.verify.hostname** specifies if host name verification is used for the SSL connection between the Administration Console and the servers. If set to **true**, each server must specify a host identity that matches the managed server listening address as specified in its key.

See "Enabling and Disabling SSL".

There are also requirements on how the SSL certificates are generated:

- If the server name is specified as a host name in the domain configuration, the common name (CN) in the certificate for the server is specified using one of these options:
  - The CN in the certificate for the server is identical to the server name defined in the domain configuration.

    In this case, a certificate must be created for each server.
  - The CN in the certificate is set to **.domain*.

    In this case, all servers can use the same certificate.

    This requires that the server names must be specified with their full names, including the domain, in the domain configuration. For example if the servers names are **server1.us.oracle.com**, **server2.us.oracle.com**, and so on, the CN is set to ***.us.oracle.com**.
- If the server name is specified as an IP-address in the domain configuration, a certificate must be generated for each server.

For more information on server identity certificate validation in HTTP/TLS, see section *3.1. Server Identity* in RFC 2818:

`http://www.ietf.org/rfc/rfc2818.txt`

## Configuring Password Security

By default, all passwords used when authenticating between the Administration Console and the Administration Server must be at least six characters long, contain at least one lowercase character, one upper case character, and one digit.

You have the option of changing these password strength requirements using property in the *Oracle_home***/ocsb61/admin_server/properties/common.properties** file:

- Whether the password is validated.
- A minimum length for the password
- Whether an upper-case character is required in the password.
- Whether a lower-case character is requried in the password.
- Whether an integer is requried in the password.

Restart the Administration Server after changing any of these properties to make them take effect.

See the system administrator's reference in *Service Broker System Administrator's Guide* for details on the settings.

## Securing the Administration Console Connection

The connection between the Administration Console and the Administration server is by default secured by SSL. The user of the Administration Console is by default asked to authenticate with the server. The default authentication method is HTTP Digest, where an encrypted version of the password is sent to the server.

Oracle strongly recommends that you retain the default security measures for a production deployment, although to streamline testing you can disable them on a test and evaluation system.

The first time you access the Administration Console, you are prompted to accept the certificate provided in the default **clientkeystore** keystore in the Administration Console server. The server uses the default credential location called *client***keystore**.

How you are prompted depends on:

- The Web browser you use
- If a self-signed certificate is used or if the certificate was provided by a certificate authority

See "Setting Up the Service Broker Public Key Infrastructure" for details on configuring and using the keystore.

You have these options for defining how to authenticate between the Administration Server and the Administration Console:

- Leave **axia.digest.auth** on its default setting of **true**, which requires a username and password to authenticate the Administration Console. The username is sent in clear text, but the password is encrypted using a nonce value. This is the most secure setting and is recommended for production deployments.
- Change **axia.digest.auth=true** to **axia.basic.auth=true**. This requires a username and password to authenticate the Administration Console, but sends them in clear text. This is less secure than using digest authentication, but may be required by some clients.
- Remove **axia.digest.auth** altogether. This disables authentication between the Administration Console and the Administration Server. This is only appropriate for test and evaluation deployment used by trusted personnel.

This digest authentication requires that passwords be encrypted as specified in IETF RFC 2617 (see `http://www.ietf.org/rfc/rfc2617.txt` for details).

Once the Administration Console to Administration Server connection is established, the communication between the Administration Console server and client is protected by HTTPS.

You can specify whether to use SSL for the HTTP session (HTTPS) or not by using the **org.eclipse.equinox.http.jetty.https.enabled** (boolean) and **org.eclipse.equinox.http.jetty.http.enabled** (boolean) settings in the *Oracle_Home***/admin_server/properties/admin.properties** file. These settings are mutually exclusive; if one is set to **true** the other must be **false**.

See the system administrator's reference appendix in *System Administrator's Guide* for details on the **admin.properties** file an its entries.

See "Enabling and Disabling SSL" for more details on using and changing the default SSL security.

## Securing Clusters

By default Oracle Cluster Coherence is not protected, which is acceptable for the typical environment. However, for untrusted environments, you can secure the Coherence cluster using the standard SSL Coherence configuration settings.

In untrusted environments, Oracle recommends that you secure the cluster by creating a Coherence configuration override file, packaging it as an OSGI bundle fragment and deploying it.

For more information on concepts of the Coherence security, refer to *Oracle Coherence 3.7 Security Guide.*

For information on how to create a Coherence configuration override file and details on the available security options, see *Oracle Coherence Release 3.7 Developer's Guide*, section *Operational Configuration Elements*, and *Oracle Coherence Security Guide*.

Both documents are available from *Oracle Coherence Knowledge Base*:

http://coherence.oracle.com/display/COH/Oracle+Coherence+Knowledge+Base+Home

The Coherence operational override configuration file must be named **tangosol-coherence-override-axia.xml** to complement, rather than replace, the override settings already defined by Service Broker.

For information on how to create an OSGi bundle fragment, refer to *OSGi Service Platform Release 4 Core specification*, section *3.14 Fragment Bundles*. The specification can be downloaded from:

http://www.osgi.org/Release4/Download

The fragment host for the OSGi fragment bundle must be **oracle.axia.storage.provider.coherence**.

## Configuring Domain Security

Service Broker collects it's processing and signalling servers into *domains* that are protected first by the firewalls that secure your physical server, second by HTTPS security, and finally using file system-level security within the server.

For General information, see the discussion about domains in *Service Broker System Administrator's Guide*.

### Securing Domains with System-Level Security

File system-level security mechanisms are used for controlling access to the domain configuration. A user that starts any of the following must have read and write privileges to the domain configuration directory and all files in it:

- Administration Server
- Scripting Engine

The Domain Web server must have read access to the domain configuration directory and all files in it.

Use operating system-specific commands to:

- Configure users that have privilege to start the Administration Server or Scripting Engine.
- Make sure these users have read/write or read access to the domain configuration directory.

Managed servers that use NFS or a local file system to read the domain configuration directory must have read access to all files in that directory.

Oracle recommends that you only allow the owner or a trusted user group to have any privileges to the directory.

### Securing Domains with Properties Settings

Most of Service Broker's application-facing security settings are contained in these property files:

- *Oracle_home*/**ocsb61/admin_server/properties**
  - **common.properties** - Contains property settings that control all actions associated with the Administration Console, which means this is where most of Service Broker's security settings are.
  - **hosting.properties** - Contains properties settings that control hosted domains. See the discussion on security for the domain configuration in *Service Broker System Administrator's Guide* for details.
  - **script.properties** - Contains properties settings for the scripting engine.
  - **admin.properties** - Contains property settings for the Administration Server and the Administration Console.
- *Domain_home*/*Domain_name*/**domain.properties** - contains domain-specific properties settings. Do not change any of these settings, they are not configurable.
- *Oracle_home*/**ocsb61/managed_server/server.properties** - Contains properties settings for the Managed Server.

For a listing and descriptions of the security settings in these files, see:

- The system administrators reference appendix in *Service Broker System Administrator's Guide*.
- The properties files themselves.

### Securing Hosted Domains

When using a hosted domain configuration accessed by a Domain Web server, you can choose to access it using HTTP or HTTPS. The default is to use HTTPS with SSL client certificate authentication.

These settings are controlled by entries in the *Oracle_home*/**ocsb61/admin_server/properties/hosting.properties** file. See system administrator's reference appendix in *System Administrator's Guide* for details on these entries.

When HTTPS and client authentication are enabled, you must configure the trusted client certificates on the managed servers in your domain. You have these options for storing the client certificates:

- Import them into default domain hosting keystore specified by the **javax.net.ssl.keyStore** parameter in **common.properties** (**clientkeystore** is the default).

  This is somewhat counter-intuitive because:

  - This stores a web *server* keystore in a default location called *client***keystore**
  - Unlike other Service Broker components, the trusted client authentication certificates are imported into a keystore rather than a separate truststore.

- Import them into a different keystore that you specify by uncommenting the **org.eclipse.equinox.http.jetty.ssl.keystore=jettysslkeystore** entry in the **hosting.properties** file. You can either use the default **jettysslkeystore**, or specify a different keystore.

## Securing Administration Clients and Managed Servers

Each domain's processing and signaling servers contain Java MBean servers for the MBeans they expose. These MBean servers all use a JMX SSL connection that requires both the server and an administration client to authenticate. Administration clients include the Administration Server and the Service Broker scripting engine.

The same security mechanisms that applies to these tools also applies to any administration client that uses JMX to configure, administer, and operate Service Broker.

Oracle recommends that you secure the JMX port with SSL encryption to enable client authentication. SSL encryption is enabled by default and is controlled by entries in the *Oracle_home*/**ocsb61/admin_server/properties/common.properties** file. See the system administrator's reference appendix in *Administrator's Guide* for details on these entries.

SSL encryption requires a public key infrastructure (PKI) where each server has a public key and a private key. The key-pair is stored in an entry in a keystore. The server uses the private key itself. The administration client use the public key.

Each administration client also has a private key and a public key.

Public keys are wrapped in public certificates that can be either self-signed or issued by a Certificate Authority (CA).

Each server has two stores:

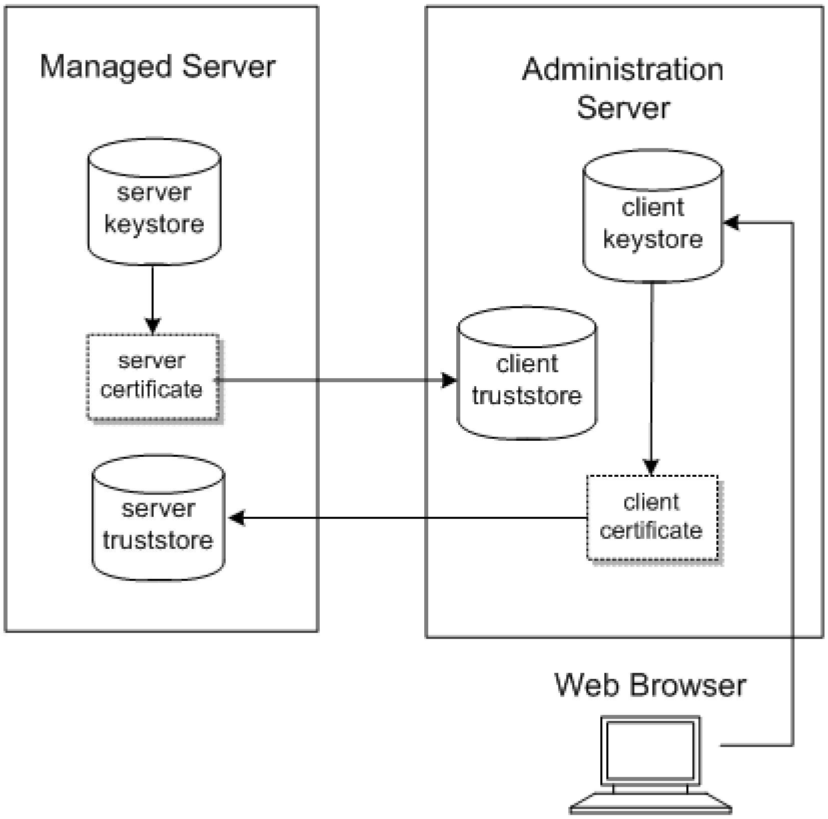
- Server keystore
- Administration client truststore

Each administration client has two stores:

- Administration client keystore
- Server truststore

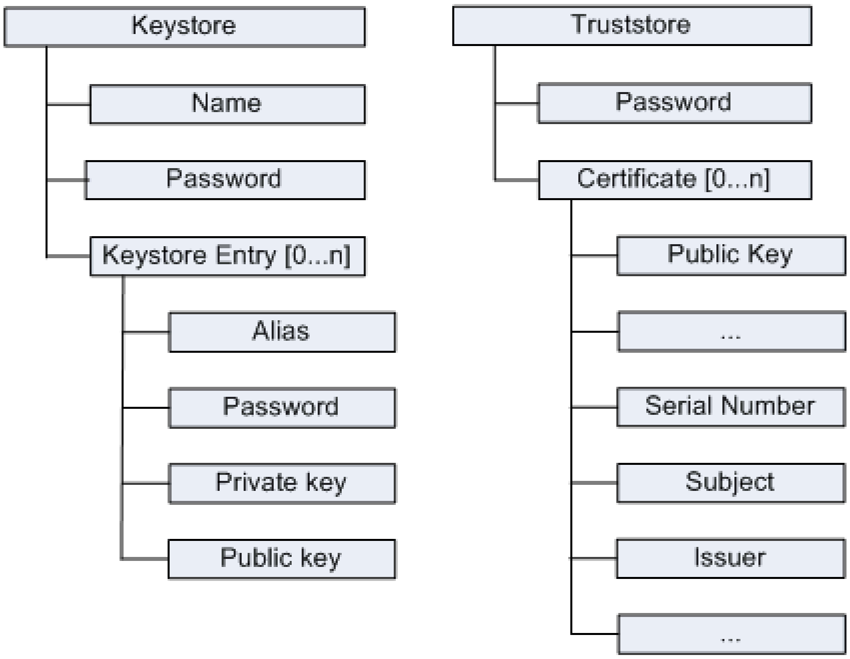
Figure 2–1 shows how the Managed Servers and Administration Server exchange certificates.

*Figure 2–1 Exchange of Certificates Between Managed Servers and the Administration Server*



A keystore contains keystore entries. A truststore contains public certificates. Figure 2–2 shows the structure of the keystore and truststore.

*Figure 2–2 Keystores and truststores*



The keystores, truststores, and certificates are files. Certificates are exported from keystores, or provided by CAs, and imported to truststores.

Each keystore has a name and a password. Each keystore entry has an alias that identifies a key-pair and a password for the entry.

Each truststore has a password. A truststore can contain one or more certificate.

The certificate contains the public key and data about the certificate such as serial number, subject (the entity being identified by the certificate), and issuer of the certificate.

It is possible to use the same certificate for all administration clients, meaning that the server truststore contains only one administration client certificate. This approach is less secure than having individual certificates for each administration client.

See "Setting Up the Service Broker Public Key Infrastructure" for details on setting up the keystores and truststores.

## Enabling and Disabling SSL

> **Note:** Oracle recommends that you do not disable SSL for production systems.

You enable and disable SSL connection security using the Service Broker system properties entries.

These system property entries control Service Broker SSL security:

- **axia.ssl** (boolean) in the **common.properties** file specifies whether SSL is enabled or disabled for the Service Broker implementation. By default, SSL is enabled.

  If SSL is enabled, use HTTPS to connect to the Administration Server or Domain Web server. If SSL is disabled, use HTTP

- **axia.admin.ssl** specifies if SSL is enabled or disabled for the administration port. Configuration updates and deployment operations are propagated to processing servers and signaling servers over this port.

- **axia.digest.auth** (boolean) in the (**admin.properties** file specifies whether to use Digest Authentication when authentication the Administration Console with the Administration Server. See "Securing the Administration Console Connection" for details.

- **axia.ssl.cipher_suites** in the **common properties** file specifies the enabled platform SSL cipher suites. See *Java Cryptography Architecture Sun Providers Documentation* Cipher Suite documentation for Sun JSSE Provider for supported values, including how to use unlimited encryption options. The property is set to a comma-separated list of cipher suites.

- **https.cipherSuites** in the **common properties** file specifies the enabled HTTPS cipher suites. See *Java Cryptography Architecture Sun Providers Documentation* Cipher Suite documentation for Sun JSSE Provider for supported values, including how to use unlimited encryption options. The property is set to a comma-separated list of cipher suites.

- **javax.net.ssl.keyStore** in the **common.properties** files specifies the SSL keystore location.

- **javax.net.ssl.trustStore** in the **common.properties** files specifies the SSL truststore location.
- **org.eclipse.equinox.http.jetty.https.enabled** in the **hosting.properties** file specifies that HTTPS connects are required for hosted domains. **org.eclipse.equinox.http.jetty.https.enabled.port** sets the port number to use for the communication.
- **org.eclipse.equinox.http.jetty.ssl.needclientauth** in the **hosting.properties** file specifies whether HTTPS is requried for the hosted domain/client connection.
- **org.eclipse.equinox.http.jetty.ssl.keystore** in the **hosting.properties** file specifies the keystore location if HTTPS is requried for hosted domains.
- **org.eclipse.equinox.http.jetty.https.enabled** in **script.properties** file specifies whether the scripting engine connections require HTTPS security.
- **org.eclipse.equinox.http.jetty.https.enabled** in the **admin.properties** file specifies whether the Administration Console requires HTTPS security for connections to the Administration Server. **org.eclipse.equinox.http.jetty.https.port** sets the port number to use for the communication
- **org.eclipse.equinox.http.jetty.ssl.keystore** in the **admin.properties** file specifies the keystore location for the Administration Server credentials.

See the system administrator's reference appendix in *Oracle Communications Service Broker System Administrator's Guide* for a complete list of the system security properties.

When you change these properties, you must restart all processing servers, signaling servers, the Administration Server, and the Domain Web server. SSL is enabled or disabled on deployment level, so all servers and administration clients must have the same setting.

## Setting Up the Service Broker Public Key Infrastructure

This section explains how to set up the Public Key Infrastructure (PKI) that you use to secure the connections between the:

- Administration Server and the Administration Console (executing as a web-based client).
- Administration Server and managed servers

By default, Service Broker creates a single credential location for both of these. However, these two types of connects are different in nature and you can create and use different locations to store credentials.

Setting up PKI procedure includes these procedures:

- Setting Up the PKI for Administration Server-Managed Server Security
- Setting Up the PKI for Administration Server to Administration Console Security

The **org.eclipse.equinox.http.jetty.ssl.keystore** system property in the **admin.properties** file controls whether you use the default keystore/truststore to secure Administration Server to Administration Console connections:

- If **org.eclipse.equinox.http.jetty.ssl.keystore** is not defined (the default), the default keystore is used.
- If **org.eclipse.equinox.http.jetty.ssl.keystore** is defined, a separate keystore is used.

See the system administrator's reference appendix in *Service Broker System Administrator's Guide* for details on the system properties.

### About Keytool and X.500 Distinguished Names

You set up the Service Broker PKI using **keytool**, a key and a certificate management tool. keytool is a part of the Oracle Java Development Kit (JDK) and is located in the *Oracle_home***/ocsb61/jdk/bin** by default. For details on keytool and the X.500 distinguished names it uses see:

`http://docs.oracle.com/javase/6/docs/technotes/tools/solaris/keytool.html`

### Setting Up the PKI for Administration Server-Managed Server Security

This section explains how to use the **keytool** program to set up the PKI between the Administration Server and managed servers using self-signed X.500 certificates.

To set up the PKI with self-signed certificates:

1. Generate the public and private keys for each managed server. Repeat this for each server:

   a. Generate the keys for the managed server:

      **keytool -genkeypair "***distinguished_name***" -alias** *server_keystore_entry* **-keypass** *key_password* **-keystore** *server_keystore* **-storepass** *server_keystore_password*

      Where:

      *distinguished_name* is a X.500 distinguished name for the issuer of the certificate. For details, see:

      `http://docs.oracle.com/javase/6/docs/technotes/tools/solaris/keytool.html`

      *server_keystore_entry* is a keystore entry for the certificate chain and the private key for the managed server.

      *key_password* is a password used to protect the private key.

      *server_keystore* is a name of the server keystore. Oracle suggests that you name your keystore so it can be identified with the server it will be used with. Example: **ssu_server_1_keystore**, **ssu_server_2_keystore**, and so on.

      *server_keystore_password* is the password that protects the server keystore.

   b. Export the public key from the managed server keystore entry into a self-signed certificate:

      **keytool -exportcert -alias** *server_keystore_entry* **-keystore** *server_keystore* **-storepass** *server_keystore_password* **-rfc -file** *server_certificate***.cer**

      Where:

      *server_keystore_entry* is the keystore entry for the certificate chain and the private key for the managed server. Same as the *server_keystore_entry* used when the keys were generated in the previous step.

      *server_keystore* is the name of the managed server keystore to export the certificate from. Same as the *server_keystore* used when the keys were generated in the previous step. Example: **ssu_server_1_keystore**, **ssu_server_2_keystore**, and so on.

*server_keystore_password* is the password setup to protect the server keystore. Same as the *server_keystore_password* used when the keys were generated in the previous step.

*server_certificate* is the name of the certificate. This certificate shall be imported to each administration client's truststore. Oracle suggests that you name your certificate so it can be identified with the server it originates from. Example: **ssu_server_1.cer**, **ssu_server_2.cer**, and so on.

2. Generate the public and private keys for each Administration Server:

   a. **keytool -genkeypair "***distinguished_name***" -alias** *client_keystore_entry* **-keypass** *key_password* **-keystore** *client_keystore* **-storepass** *client_keystore_password*

      Where:

      *distinguished_name* is a X.500 distinguished name for the issuer of the certificate.

      *client_keystore_entry* is a keystore entry for the certificate chain and the private key for the Administration Server.

      *key_password* is a password used to protect the private key.

      *client_keystore* is a name of the Administration Server keystore. Oracle suggests that you name your keystore so it can be identified with the administration client it will be used with. Example: **admin_1_keystore**, **admin_2_keystore**, and so on.

      *client_keystore_password* is the password that protects the Administration Server keystore.

   b. Export the public key from the Administration Server keystore entry into a self-signed certificate:

      **keytool -exportcert -alias** *client_keystore_entry* **-keystore** *client_keystore* **-storepass** *client_keystore_password* **-rfc -file** *client_certificate***.cer**

      Where:

      *client_keystore_entry* is the keystore entry for the certificate chain and the private key for the Administration Server. Same as the *client_keystore_entry* used when the keys were generated in the previous step.

      *client_keystore* is the name of the Administration Server keystore to export the certificate from.

      *client_keystore_password* is the password setup to protect the Administration Server keystore. Same as the *client_keystore_password* used when the keys were generated in the previous step.

      *client_certificate* is the name of the certificate. This certificate is imported to each server's truststore. Oracle suggests that you name your certificate so it can be identified with the administration client it originates from. Example: **admin_1.cer**, **admin_2.cer**, and so on.

3. Repeat Step 2 for each Administration Server.

4. Import the server certificate into the administration client truststore:

   **keytool -importcert -file** *server_certificate* **-keystore** *client_truststore* **-storepass** *client_truststore_password* **-noprompt**

   Where:

*server_certificate* is the name of the server certificate. Example: **ssu_server_1.cer**, **ssu_server_2.cer**, and so on.

*client_truststore* is a name for the administration client truststore.

*client_truststore_password* is the password that protects the administration client truststore.

5. Repeat Step 4 for each Administration Server.

6. Import the Administration Server certificate into the server truststore:

   **keytool -importcert -file** *client_certificate* **-keystore** *server_truststore* **-storepass** *server_truststore_password* **-noprompt**

   Where:

   *client_certificate* is the name of the administration client certificate. Example: **admin_1.cer**, **admin_2.cer**, and so on.

   *server_truststore* is a name for the server truststore.

   *server_truststore_password* is the password that protects the server truststore.

7. Repeat Step 6 for each server.

8. Distribute the keystores and truststores to the servers and administration clients.

   > **Note:** The keystores and trustores might be in different directories and might have different names than specified below. The following directories and file names are according to default settings. See "Setting Up the Service Broker Public Key Infrastructure".

   a. Identify which keystore-truststore pair belongs to which server or administration client.

   b. Copy the keystore-truststore pair to the correct server. Repeat this for each server:

      Copy or use FTP to put the keystore in:

      *Oracle_home*/**ocsb61/managed_server/serverkeystore**

      Copy or use FTP to put the truststore in:

      *Oracle_home*/**ocsb61/managed_server/servertruststore**

   c. Copy the keystore-truststore pair to the correct administration client. Repeat this for each administration client:

      Copy or use FTP to put the keystore in:

      *Oracle_Home*/**ocsb61/admin_server/clientkeystore**

      Copy or use FTP to put the truststore in:

      *Oracle_Home*/**ocsb61/admin_server/clienttruststore**

### Setting Up the PKI for Administration Server to Administration Console Security

This section explains how to use the keystore/truststore you created in Setting Up the PKI for Administration Server-Managed Server Security for Administration Server to Administration Console security.

You have the option of using the Service Broker default credentials location, or a different location. See "Setting Up the Service Broker Public Key Infrastructure" for details about setting up the credential locations.

To set up Administration Server to Administration Console security:

1. Change directory to:

   *Oracle_home*/**ocsb61/admin_server/properties**

2. Open the **admin.properties** file for editing.

   See the system administrator's reference appendix in *Service Broker System Administrator's Guide* for details on this property file setting.

3. Set the **org.eclipse.equinox.http.jetty.ssl.keystore** system property entry for your implementation:

   - To use the default credential location make sure there is a hash-sign (#) before the entry.

     Example: **#org.eclipse.equinox.http.jetty.ssl.keystore=jettysslkeystore**

   - To use a different location, make sure there is no hash-sign (#) before the entry in this file and specify a new location for the keystore:

     Example: **#org.eclipse.equinox.http.jetty.ssl.keystore=***new_keystore_location*

     The value of this property is the file name of and path to the keystore. When using relative paths, it is relative to the directory **admin_server**

4. Save and close the **admin.properties** file.

5. Change directory to:

   *Oracle_home*/**ocsb61/admin_server**

6. Use keytool to generate a public and private key for the Administration Server and store them in the administration client keystore:

   **keytool -genkeypair "***distinguished_name***" -alias** *keystore_entry* **-keypass** *key_password* **-keystore** *keystore* **-storepass** *keystore_password*

   Where:

   *distinguished_name* is a X.500 distinguished name for the issuer of the certificate. See "About Keytool and X.500 Distinguished Names".

   *keystore_entry* is a keystore entry for the certificate chain and the private key for the server.

   *key_password* is a password used to protect the private key.

   *keystore* is the name of the keystore defined for the administration client keystore. Example: **console_keystore**.

   *keystore_password* is the password that protects the administration client keystore.

7. Repeat Step 6 for each administration Client.

8. Use keytool to export the public key from the keystore entry into a self-signed certificate:

   **keytool -exportcert -alias** *keystore_entry* **-keystore** *keystore* **-storepass** *keystore_password* **-rfc -file** *certificate***.cer**

   Where:

*keystore_entry* is the keystore entry for the certificate chain and the private key for the server. Same as the *keystore_entry* used when the keys were generated in the previous step.

*keystore* is the name of the keystore to export the certificate from. Same as the *keystore* used when the keys were generated in the previous step. Example: **console_keystore**.

*keystore_password* is the password setup to protect the administration client keystore. Same as the *keystore_password* used when the keys were generated in the previous step.

*certificate* is the name of the certificate. This certificate shall be imported to the Administration Server truststore. Oracle suggests that you name your certificate so it can be identified with the Administration Server. Example: **web_client_server.cer**.

9. Use keytool to import the certificate into the administration client truststore:

   **keytool -importcert -file** *certificate* **-keystore** *truststore* **-storepass** *truststore_password* **-noprompt**

   Where:

   *certificate* is the name of the server certificate. Example: **web_console_server.cer**.

   *truststore* is the name for the Administration Server truststore.

   *truststore_password* is the password that protects the truststore.

## Setting Up a Credential Store

Service Broker provides a Credential Store feature to store credentials for applications and protocols that use username credentials or keystores for access. See "Administering Credential Stores" for details on setting up the Credential Store.

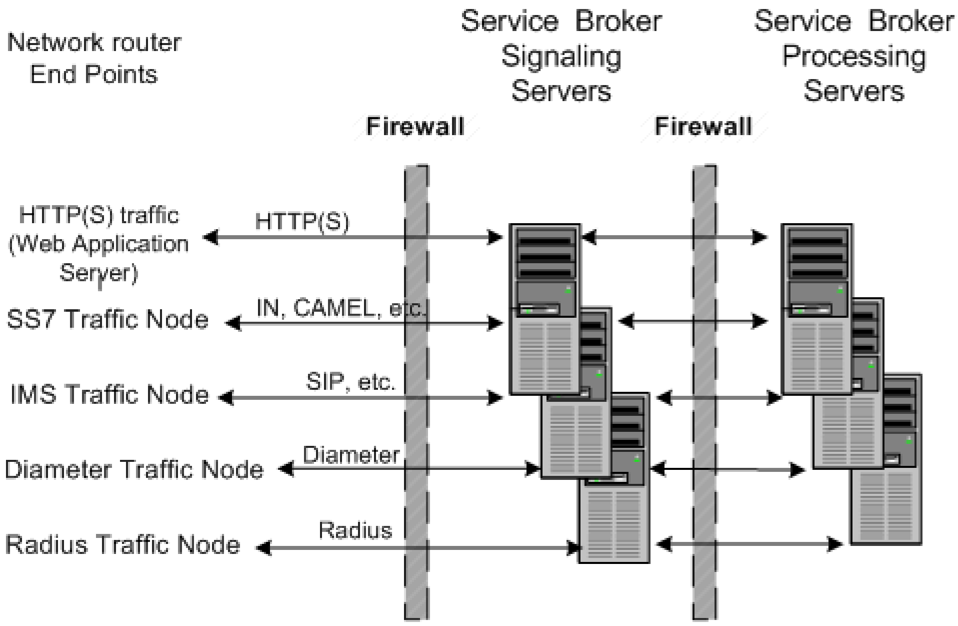
## Setting Up Network Communication End Points

Service Broker communicates with Telecom networks using a variety of supported IMS and SS7-based protocols. You secure communication with network elements by creating Signaling Server Units (SSUs) that are network communication end points for the network traffic. Each protocol SSU has its own security features based on the individual precool. See "Securing Network Communication" for details on securing traffic for individual protocols.

## Securing Service Broker with Firewalls

Figure 2–3 shows a typical Service Broker production deployment. Oracle recommends that you protect Service Broker from security risks by configuring firewalls between each the Service Broker processing layers, and between Service Broker and any network traffic. See your firewall product documentation for information on how to set them up with Service Broker.

*Figure 2–3 Service Broker Security Architecture Overview*



## Securing Network Traffic with Protocol-Specific Security

Because Service Broker supports a variety of protocols, it relies on the security features of those individual protocols for higher-level security support. The combination of firewall protection and protocol-level security support protect Service Broker from network security risks.

The Service Broker Service controller features mediate between various telecom network protocols. Securing communication protocols mainly involves creating virtual “white lists” of trusted systems to communicate with.

### HTTPS Protocol Required for Production

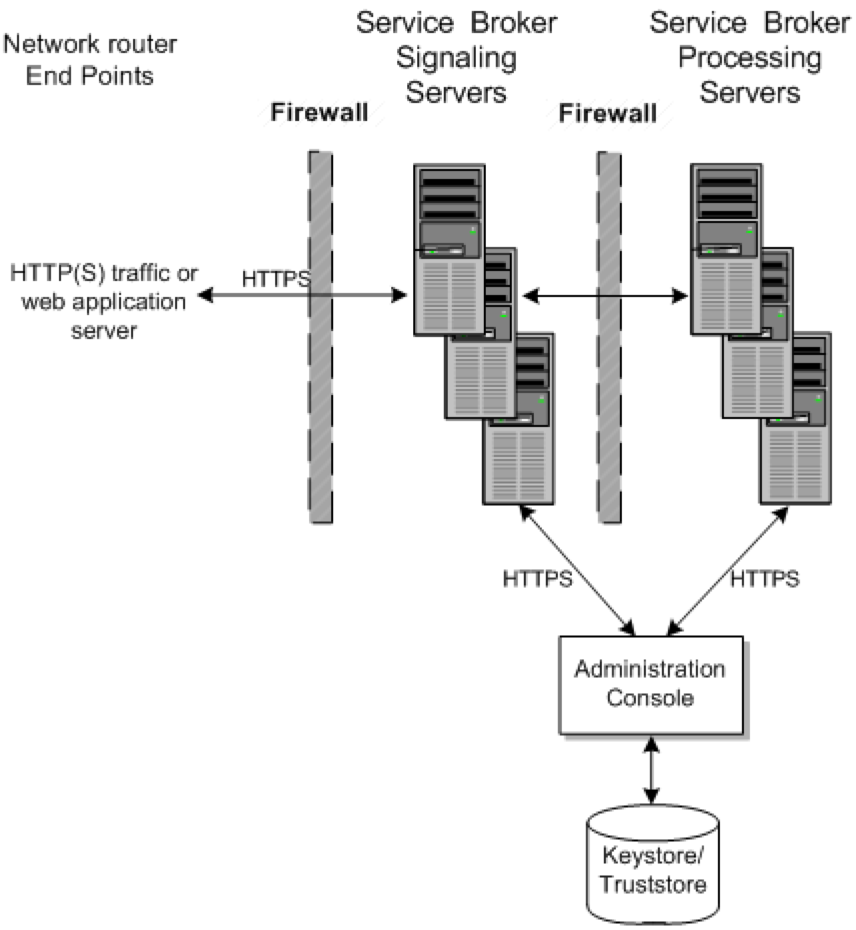
You have the option of using either HTTP or HTTPS for test and evaluation Service Broker implementations, but production implementations must use the security provided by HTTPS/SSL/TLS. All web applications that you use with Service Broker must support HTTPS/SSL/TLS features.

The HTTPS/SSL/TLS network traffic that passes to Service Broker is protected by HTTPS/SSL/TLS security, and all applications and internet entities must support HTTPS to work with Service Broker.

During installation, you configure the keystores and truststores that Service Broker uses to authenticate HTTPS traffic. Figure 2–4 shows how the Service Broker SSU and PN servers share the stores. See *Service Broker System Administrator’s Guide* for details on setting up the keystores and truststores.

Service Broker also includes a Credential Store feature for programs that use username credentials instead of HTTPS-style certificates (for example, LDAP servers). See *Service Broker System Administrator’s Guide* for details on setting up Credential Stores.

***Figure 2–4 Service Broker HTTPS Keystores and Truststores***

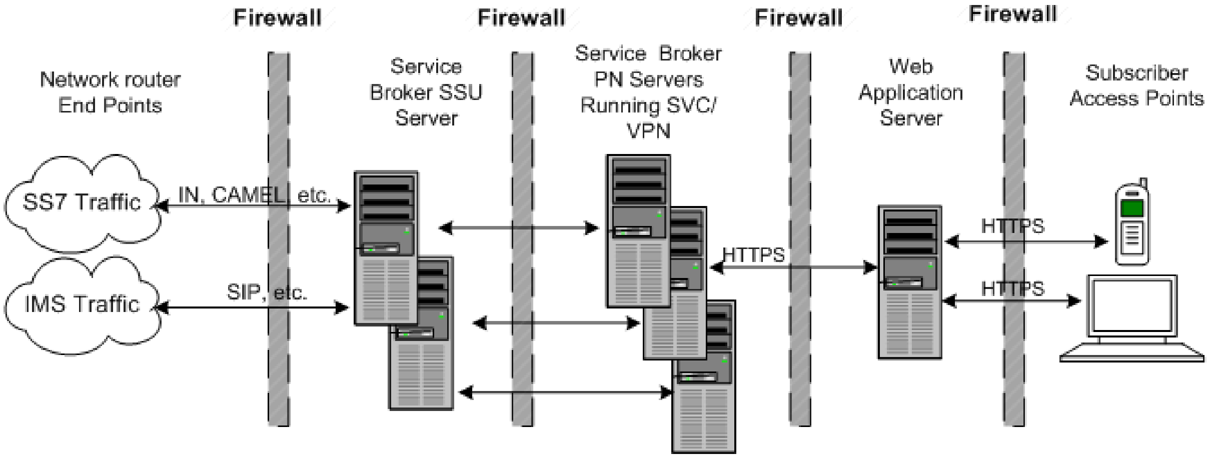


## Securing the SVC and VPN Features

The Service Broker Social Voice Communicator (SVC) feature application runs inside of Service Broker so it is protected from your web application server and Internet nodes by two layers of firewall and HTTPS support.

Figure 2–5 shows a Service Broker implementation with the SVC and VPN features configured. Both of these features run inside Service Broker in a Processing Server. The Processing Server executes the RESTful interface that these features are base on. Once set up, your subscribers access the SVC/VPN features through a web interface that you create and run on a web application server. This diagram illustrates the firewalls required to secure them. Your subscribers access the web interface using the HTTPS protocols. See "Setting Up the Service Broker Public Key Infrastructure" for details on setting up the PKI required to use HTTPS.

*Figure 2–5 Service Broker SVC/VPN Security Overview*



## Securing the SVC Feature

Other than requiring HTTPS and an additional firewall to protect the web application server, there are no special security considerations for using this feature. See *Service Broker Social Voice Communicator Implementation Guide* for details on how to set up and use this feature, and the remainder of this chapter for instructions on how to implement a secure Service Broker.

## Securing the VPN Feature

The Service Broker VPN feature requires HTTPS and an additional firewalls to protect the web application server that your subscribers use to access this feature. Also see *Service Broker VPN Implementation Guide* for other security considerations.

# Securing the Online Mediation Controller Feature

If you use the Online Mediation Controller to mediate between Service Broker and your online charging application, see these documents for instructions on how to set it up securely:

- Your online charging application's documentation.
- The "Securing Network Communication" section.
- The discussion on setting up RADIUS Mediation for Authentication and Authorization in the Radius in *Service Broker Online Mediation Controller Implementation Guide*.

# Securing Network Communication

This section explains the protocol-specific security features that Service Broker uses to communicate securely over networks using supported protocols. Service Broker implements protocol security features in the signaling domain. Service Broker provides a Signaling Server Unit (SSU) for each of the supported protocols. You use the SSUs to configure the protocol, including security. An SSU might contain session timers, encryption choices, client port number or other protocol-specific security parameters. The supported protocols include:

- SIP

- SS7 SIGTRAN M3UA
- SS7 TDM
- Diameter
- Radius
- SMPP
- PCP (Oracle Communications BRM)
- ECE (Oracle Communications ECE)
- Web Services (SOAP or REST over HTTP)

You configure these SSUs using the Administration Console, or in some cases Java MBeans exposed for this purpose.

For details on these SSUs and how to configure them, see *Service Broker System Administrator's Guide*.

The following sections list the security options that you configure for each protocol.

## SIP

You use the SSU SS7 SIGTRAN or the corresponding Java MBeans to set up security by specifying trusted SIP network entities that use SIP network channels you specify. See configuring SIP Signaling Server Units in *Service Broker Signaling Server Units Configuration Guide* for details.

In addition, Oracle recommends that you implement security measures appropriate to your implementation, such as:

- Implement the IPsec protocol between the system running Service Broker and the network nodes.
- Use TLS tunneling between the network node and Service Broker by implementing a load balancer/firewall (such as an F5 load balancer) at the DMZ that performs hardware acceleration/offloading on the secured connection from the firewall to the external network element.

## SS7 SIGTRAN M3UA

You use the SSU SS7 SIGTRANN or the Java MBeans operations and parameters to set up security by specifying M3UA layer, trusted SCCP sites, and incoming routing rules for SIGTRAN network traffic. See the discussion on configuring SIP Signaling Server Units in *Service Broker Signaling Server Units Configuration Guide* for details.

## SS7 TDM

You use the SSU SS7 SIGTRANN or the Java MBeans to set up security by specifying MTP connectivity and mapping, SCCP addresses, and incoming routing rules for TDM network traffic. See configuring the SS7 Signaling Server Units for TDM in *Service Broker Signaling Server Units Configuration Guide* for details.

## Diameter

You use the SSU Diameter or the corresponding Java MBeans to set up security by specifying trusted nodes and peers, and creating routing rules for their network traffic. See configuring Diameter Signaling Server Units in *Service Broker Signaling Server Units Configuration Guide* for details.

In addition, Oracle recommends that you implement security measures appropriate to your implementation, such as:

- Implement the IPsec protocol between the system running Service Broker and the network nodes.
- Use TLS tunneling between the network node and Service Broker by implementing a load balancer/firewall (such as an F5 load balancer) at the DMZ that performs hardware acceleration/offloading on the secured connection from the firewall to the external network element.

## Radius

You use the SSU Radius to set up security by specifying trusted clients to accept accounting and authentication requests from. The SSU Radius also supports the Service Broker Credential Store feature for storing username credentials for Radius users.

The Service Broker SSU Radius supports these authentication methods:

- EAP MDS
- EAP-TLS
- EAP-TTLS with inner authentication (PAP, CHAP, EAP-MD5, MSCHAPv2)
- PAP
- CHAP

See configuring Diameter Signaling Server Units in *Service Broker Signaling Server Units Configuration Guide* for details on configuring the SSU Radius. See securing credentials with Credential Store in *Service Broker System Administrator's Guide* for details on using the Credential Store.

## SMPP

You use the Service Broker SMPP SSU or the corresponding MBeans to set up security by specifying trusted Short Message Service Centers (SMSCs) and the Extended Short Message Entities (ESMEs) they connect to.

See configuring SMPP Signaling Server Units in *Service Broker Signaling Server Units Configuration Guide* for details. See securing credentials with Credential Store in *Service Broker System Administrator's Guide* for details on using the Credential Store.

## PCP (Oracle Communications BRM)

You use the Service Broker SSU PCP or the corresponding MBeans to set up security by specifying a trusted Oracle Communications BRM connection manager (CM) to connect Service Broker to. You specify the specific CM pool ID, host, port, and so on, that identifies the CM. The SSU PCP also supports the Service Broker Credential Store feature for storing username credentials required by BRM.

See configuring PCP Signaling Server Units in *Service Broker Signaling Server Units Configuration Guide* for details. See securing credentials with Credential Store in *Service Broker System Administrator's Guide* for details on using the Credential Store.

### ECE (Oracle Communications ECE)

The Service Broker connection to the Oracle Communications ECE Coherence cluster can be secured using SSL. The SSU ECE also supports the Service Broker Credential Store feature for storing username credentials required by ECE.

To use Service Broker SSL communication with ECE, obtain the ECE credentials, well known address, and port information for the ECE Coherence cluster. Use the information to populate the SSU ECE settings in the Administration Console. Additional steps are required to complete the configuration on both the ECE and Service Broker host.

See the chapter on configuring the ECE Signaling Server Unit in *Service Broker Signaling Server Units Configuration Guide* for more information on configuring the SSL connection to ECE. See securing credentials with Credential Store in *Service Broker System Administrator's Guide* for details on using the Credential Store.

### Web Services (SOAP or REST over HTTP)

You use Service Broker SSU Web Services to specify trusted web entities that Service Broker communicates with by specifying incoming and outgoing routing rules. You also set up HTTP network access points (addresses and ports) for your trusted nodes to use, the SSL security (credential store settings), and set the authentication method (basic or digest).

The SOAP Web Services protocol adapter uses the HTTP protocol adapter network access points, and inherits any security configured for the context used. It also supports the Service Broker Credential Store feature for storing username credentials to authenticate traffic.

See configuring Web Services Signaling Server Units in *Service Broker Signaling Server Units Configuration Guide* for details. See securing credentials with Credential Store in *Service Broker System Administrator's Guide* for details on using the Credential Store

## Monitoring Service Broker Events

You may choose to monitor Service Broker events, such as creating a VPN administrative user, or changing user permissions, using its runtime MBeans. For details on setting up monitoring, see the monitoring Service Broker discussion in *Service Broker System Administrator's Guide*.

# 3

# Administering Credential Stores

This chapter explains how to configure and use the Oracle Communications Service Broker (Service Broker) credential store feature. You use this feature to securely store, encrypt, and validate the credentials that Service Broker uses to communicate with network entities. Non-SSL network entities can use the credentials for simple access, and SSL-enabled network entities can use it to encrypt network traffic.

## About Credential Store

Oracle recommends that your Service Broker application-facing network traffic have at least a minimum security level that can usually be satisfied by a combination of firewall protection, and the traffic encryption supplied by HTTPS/SSL/TLS support. Oracle recognizes however, that Service Broker must also communicate with certain non-SSL-compliant entities that still require credentials for access. The Service Broker credential store feature securely provides credentials for both of these types of network entities.

The credential store provides a consistent, efficient, secure way for each OSGI bundle to encrypt, store, and validate credentials for connecting with the network entities that communicate with Service Broker features. For example, an SMS-C on a telecom network usually requires a password for access. Credential store provides a secure place for Service Broker entities such as the SMPP Protocol Adaptor to store and validate that password when accessing SMS-C data and features.

The Service Broker credential store:

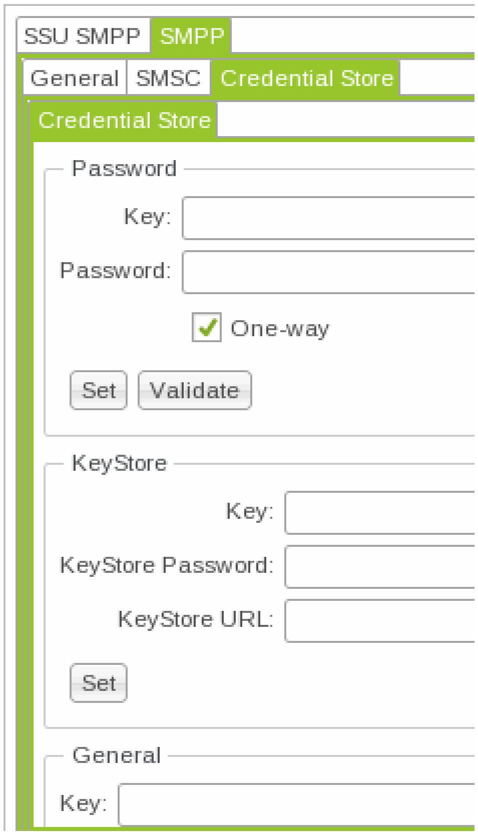
- Stores and validates passwords (1-way encryption).
- Stores and retrieves passwords (2-way encryption)
- Stores and retrieves keystores (databases of credentials).

The credential store components include:

- A single encrypted file that contains the credential stores for all OSGi bundles in a domain.
- A master password file to unencrypt each file of credentials.
- GUI interfaces in the Administration Console that you use to add credentials to the credential file singly.
- MBean operations to provision the credential store in bulk

All Service Broker features that use credential store have **Credential Store** subtabs in the Administration Console. Figure 3–1 shows the **Credential Store** subtab of the Administration Console **Data Store** tab. The other credential store subtabs are the same or very similar.

***Figure 3–1 Example Credential Store Subtab***



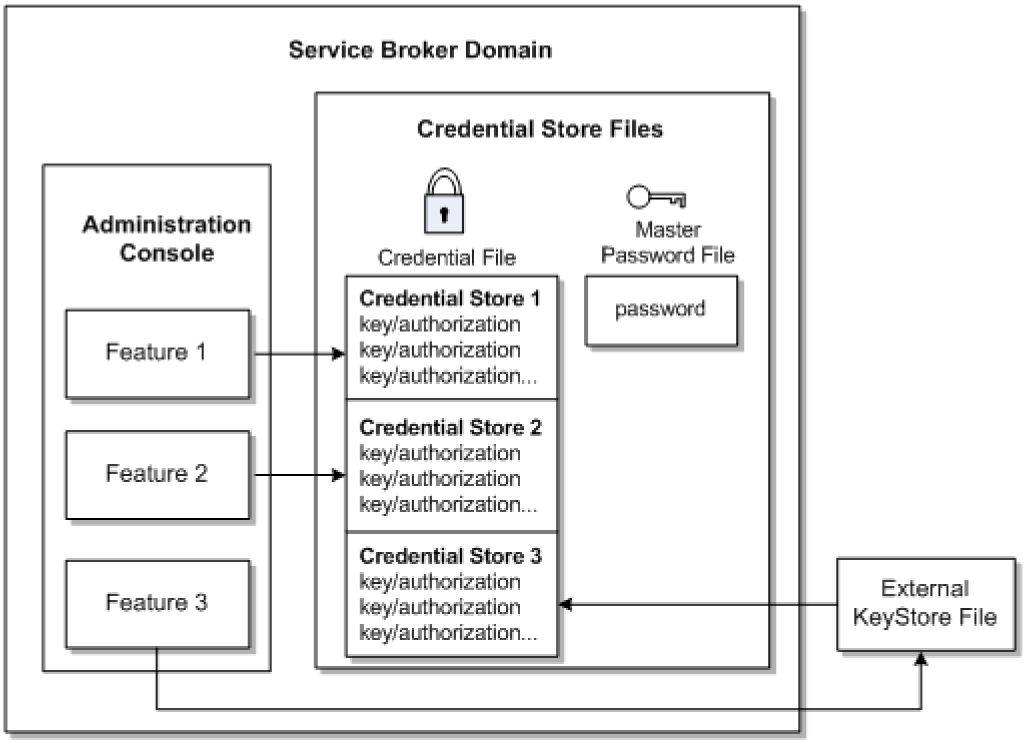
Credential store works on the Service Broker domain level; all credentials for all OSGi bundles in a domain are stored in a single file. You configure and use credential store features through the Administration Console or the MBean interface.

## Understanding How Credential Store Works

By default, Service Broker creates a credential store file in each domain for use by the Service Broker components in that domain. Figure 3–2 shows the credential store components. Each Service Broker domain contains two files, a *credential file* and a *master password file*. The credential file stores the credentials and the master password file unencrypts the credential file.

Each credential that Service Broker stores is composed of two parts: a *key* (such as a username) that identifies the protected entity and an associated *authorization* (such as a password or keystore certificate) to make it accessible. Both the key (sometimes referred to as a CredentialKey) and the authorization are stored as arbitrary strings. For example, a key could be a simple username, a fully qualified LDAP domain name, or a logical alias to a credential.

*Figure 3–2 Provisioning Credential Stores*



The credential file is encrypted and can be unencrypted with the *master password* stored in the second credential store file, the master password file. A default master master password is created automatically for each credential store file when its Service Broker domain is created. The default master password is a human-readable random string. Once created, you can change this password as necessary.

Table 3–1 shows the default credential store file names and locations for each domain.

*Table 3–1 Credential Store System Properties*

| Property | Default Value | Description |
|---|---|---|
| **axia.credential.store.url** | *domain_home*/**protected/cs_store** | Specifies the URL of the credential file. All Service Broker components (for example all managed servers and consoles) that access a domain share the same credential file. This file must also be secured by the operating system file permission settings. |
| **axia.credential.store.key.url** | *domain_home*/**protected/cs_key** | Specifies the URL of the master password protecting the credential store file. All Service Broker components that access a domain share the same master password file. This file must also be secured by the operating system file permission settings, and Oracle recommends that you move this file from its default location as an extra level of security. See "Moving the Credential Store Key Files" for more information. |

The credential store feature creates one set of these credential file/master password file pairs for each Service Broker domain, for use by all OSGi bundles in that domain. However each credential store within the credential file is isolated, so credentials do not need to be unique within the domain, just unique within one OSGi bundle. You can store identical credentials in different credential stores in the same credential file.

Together the credential file/master password file pairs protect the credentials in the credential store file.

You can change the credential store encryption methods to suit your needs. For more information see "Changing Credential Store Encryption Settings".

You administer credentials singly using the Administration Console or in bulk using an MBean interface. See "Provisioning and Administering Credential Stores" and "Using the Credential Store Management API" for more information.

### Considerations for Using Credential Store with Hosted Domains

Using credential store with hosted domains requires special considerations since managed servers do not have access to the **/protected** directory over HTTP in a hosted domain.

These are two options for using credential store with hosted domains:

- The most secure strategy is to copy the **cs_store** and **cs_key** files from the *domain_home*/**protected** location to an identical location on each managed server accessing the hosted domain. If this default location does not work for your implementation, you can change it by specifying a different path in the Java system properties using: **axia.credential.store.url** and **axia.credential.store.key.url**. For example:

  ```
  -Daxia.credential.store.url=file:///local_path/cs_store
  -Daxia.credential.store.key.url=file:///local_path/cs_key
  ```

  This approach requires that the **cs_store** file be copied to all managed servers every time the credential store files change. When the encryption key is updated, the updated **cs_key** file must be copied to each of the domain managed servers.

- A "medium" level security alternative is to copy the **cs_key** file from *domain_home*/**protected** to an identical location on each of the managed servers, and move the **cs_store** file to the Administration Console *domain_home*.

  To make this work, you must change the system properties on both the Administration Console and all of the managed servers to specify the new file locations. For example, you could use this system property to start the Administration Console:

  ```
  -Daxia.credential.store.url=file:///domain_home/cs_store
  ```

  And use this system property on each of the managed servers accessing the hosted domain:

  ```
  -Daxia.credential.store.url=https://Domain_Post_IP:9000/cs_store
  ```

  This approach removes the need to manually copy the **cs_store** file for each credential store update, but still protects the encryption key from being shared over the network.If the encryption key is ever updated, the **cs_key** file must be copied to each of the domain managed servers again, but this is uncommon.

## Configuring the Credential Store Domain Settings

The following sections explain the options for changing credential store settings. The settings in the following sections apply to *all* features that use credential store in a single domain. These settings apply to the entire credential store file. Because they apply to all features within a domain using credential store, you should only set them once, before you start storing credentials in them.

### Moving the Credential Store Key Files

The default **/protected** location that Service Broker uses for the credential store files is a special area of the domain is that is more secure than most. It is accessible by the Administration Console but not the managed server.

You can move the credential store files to new locations as desired by renaming the credential store path in the System Property.

> **Note:** For extra security, Oracle recommends that you move the **cs_key** master password file to a nondefault location and give it the minimum possible access permissions.

### Changing Credential Store Encryption Settings

This section explains how to change the credential store password storage configuration settings. Table 3–2 lists the default encryption methods and the system properties you use to change them.

> **WARNING: Previously stored credentials become unavailable if you change encryption settings. Make encryption setting changes before you start storing credentials.**

***Table 3–2 Credential Store Default Encryption Settings***

| System Property in common.properties | Default Value | Notes |
|---|---|---|
| **oracle.axia.credential.store.cipher.algorithm** | AES | Sets the cipher algorithm that encrypts/decrypts data. |
| **oracle.axia.credential.store.key.generator.aloritghm** | AES | Sets the algorithm that generates secret keys. |
| **oracle.axia.credential.store.digest.algorithm** | SHA-256 | Sets the algorithm that hashes data. |

To change these settings add these entries to the *Oracle_home***/ocsb61/admin_server/properties/common.properties** file and then restart the domain.:

```
oracle.axia.credential.store.cipher.algorithm=DES
oracle.axia.credential.store.key.generator.algorithm=RC2
oracle.axia.credential.store.digest.algorithm=
```

Table 3–3 lists the types of algorithms to use. See this discussion on *Java Cryptography Architecture Standard Algorithm Name Documentation* for more information on the encryption algorithms available: `http://docs.oracle.com/javase/6/docs/technotes/guides/security/StandardNames.html`.

***Table 3–3 Credential Store Algorithm Types***

| System Property in common.properties | Type of Algorithm |
|---|---|
| **oracle.axia.credential.store.cipher.algorithm** | **Cipher** |

*Table 3–3 (Cont.) Credential Store Algorithm Types*

| System Property in common.properties | Type of Algorithm |
|---|---|
| **oracle.axia.credential.store.key.generator.alorithm** | **KeyGenerator** |
| **oracle.axia.credential.store.digest.algorithm** | **MessageDigest** |

### Backing Up Credential Store files

Ensure that your domains are backed up, which also backs up the credential store files they contain. For more information, see the discussion on backing up your installation in the *Oracle Communications Service Broker System Administrator's Guide*.

## Provisioning and Administering Credential Stores

Each Service Broker feature that uses credential store has an Administration Console subtab that looks like the one in Figure 3–1. The following sections describe how to use these subtabs to add credentials to the credential store files and administer them. Figure 3–2 illustrates credential store provisioning.

These actions operate on one credential at a time. This may be appropriate for test and evaluation systems and small implementations. Service Broker offers an MBean interface to manage credentials in bulk. See "Using the Credential Store Management API" for more information.

### Storing or Validating a Credential (Password) in the Credential Store

To add a credential to the credential store:

1. Open the Administration Console and navigate to your feature's **credential store** tab or subtab.
2. In the **Password** area of the screen enter the following:
   - A credential key (such as a username) in the **Key** field.

     You can store any credential that can be read as a string.
   - A password in the **Password** field.
3. (Optional) Check the **One-Way** box to restrict the credential to read-only use.
4. Do one of the following:
   - Click **Set Password** to add the credential to the credential file.
   - Click **Validate Password** to confirm that this credential already exists in the credential file.

### Storing a Keystore in a Credential Store

To add a keystore from a keystore file to a credential store:

1. Open the Administration Console and navigate to your feature's **Credential Store** tab or subtab.
2. In the **Keystore** area of the screen, enter the following:
   - The keystore name in the **Key** field.
   - The keystore password in the **KeyStore Password** field.
   - The keystore URL in the **KeyStore URL** field. This is the location of the keystore file.

3. Click the **KeyStore** button to add the keystore to the credential file.

### Verifying that a Credential Exists in a Credential Store

Use these steps to verify whether a credential exists in a credential store file. These steps to not validate the credential.

1. Open the Administration Console and navigate to your feature's **Credential Store** tab or subtab.
2. In the **General** area of the screen, enter key name in the **Key** field
3. Click the **Contains Key?** button.

### Deleting Credentials from the Credential Store

Use the following steps to delete credentials from a credential store.

1. Open the Administration Console and navigate to your feature's **Credential Store** tab or subtab.
2. In the **General** area of the screen, enter key name in the **Key** field
3. Click one of the following buttons:
   - Click the Delete Key button to remove the credential from the credential file
   - Click the Delete All Keys button to remove all credentials in the credential file.

## Using the Credential Store Management API

The Service Broker credential store feature includes the **oracle.axia.api.management.credentialstore.CredentialStore** MBean that you use to to manage credentials for OSGi bundles in bulk. The Administration Console also enables you to manage credentials, but only singly.

The following section lists the credential store operations for administration and management of credentials, including:

- setPassword - Adds passwords to a credential store.
- validatePasssword - Validates passwords stored in a credential store.
- setKeystore - Adds keystore credentials to a credential store.
- containsKey - Confirms that a credential exists in a credential store
- deleteKey - Deletes keystore credentials from a credential store
- clear (Removes all Credentials) - Removes all credentials from a credential store.

### setPassword

Adds a credential (key and authorization) to the Service Broker bundle's credential store file.

Syntax:

```
void setPassword(@Name("Key") String key, @Name("Password") String password,
@Name("One-way") boolean oneWay)
```

Where:

- **Key** - The credential key.
- **Password** - The authorization string to use for the credential.

- **one-way** | **two-way** - **one-way** encrypts the password and prevents it from being decrypted later (most secure). **two-way** encrypts the password and allows it to be decrypted later.

### validatePasssword

Validates credential information against a credential stored in a credential store file. Returns true if the two are identical.

Syntax:

```
boolean validatePassword(@Name("Key") String key, @Name("Password") String
password)
```

Where:

- **Key** - The credential key.
- **Password** - The authorization string to use for the credential.

### setKeystore

Obtains a keystore from a keystore file and stores it in a credential store file. Requires a keystore key, password, and the URL of the keystore file.

Syntax:

```
void setKeystore(@Name("Key") String key, @Name("KeyStore Password") String
password, @Name("KeyStore URL") String url)
```

Where:

- **Key** - The credential key for the keystore.
- **KeyStore Password** - The authorization to use for the keystore.
- **KeyStore URL** - The URL location of the keystore file.

### containsKey

Returns true if the key exists in the credential store; false otherwise.

Syntax:

```
boolean containsKey(@Name("Key") String key)
```

Where:

- **key** - The credential key to search for.

### deleteKey

Deletes a credential from a credential store file.

Syntax:

```
void deleteKey(@Name("Key") String key)
```

Where:

- **key** - The credential to delete.

### clear (Removes all Credentials)

This operation removes all credentials associated with an OSGi bundle from a credential store file.

Syntax:

```
void clear()
```