HP Business Service Management

For the Windows, Linux operating systems

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Hardening Guide

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Contents

Chapter 1

Introduction to Hardening

This chapter introduces the concept of a secure BSM platform and discusses the planning and architecture required to implement a secure platform. It is strongly recommended that you read this chapter before proceeding to the following chapters, which describe the actual hardening procedures.

The BSM platform is designed so that it can be part of a secure architecture, and can therefore meet the challenge of dealing with the security threats to which it could potentially be exposed.

The hardening guidelines deal with the configuration required to implement a more secure (hardened) BSM platform. The hardening guidelines relate to both single machine (where all servers are installed on the same machine) and distributed (where all servers are installed on separate machines) deployments of BSM. You can also invoke dedicated Gateway deployment, in which several Gateway servers are assigned different tasks.

The hardening information provided is intended primarily for BSM administrators, and for the technical operator of each component that is involved in the implementation of a secure BSM platform (for example, the Web Server). These people should familiarize themselves with the hardening settings and recommendations prior to beginning the hardening procedures.

Deploying BSM in a Secure Architecture

Several measures are recommended to securely deploy your BSM servers:

- **DMZ architecture using a firewall**

  The secure architecture referred to in this document is a typical DMZ architecture using a device as a firewall. The basic concept of such an architecture is to create a complete separation, and to avoid direct access between the BSM clients and the BSM servers.

- **Secure browser**

  Internet Explorer in a Windows environment and FireFox in a Linux environment must be configured to securely handle Java scripts, applets, and cookies. SSL communication protocol Secure Sockets Layer protocol secures the connection between the client and the server. URLs that require an SSL connection start with HTTPS instead of HTTP.

- **Reverse proxy architecture**

  One of the more secure and recommended solutions is to deploy BSM using a reverse proxy. BSM fully supports reverse proxy architecture as well as secure reverse proxy architecture.

The following security objectives can be achieved by using a reverse proxy in DMZ proxy HTTP/HTTPS communication with BSM:

- No BSM logic or data resides on the DMZ.
- No direct communication between BSM clients and servers is permitted.
- No direct connection from the DMZ to the BSM database is required.

- The protocol used to communicate with the reverse proxy can be HTTP or HTTPS. HTTP can be statefully inspected by firewalls if required.
- A static, restricted set of redirect requests can be defined on the reverse proxy.
- Most of the Web server security features are available on the reverse proxy (authentication methods, encryption, and others).
- The reverse proxy screens the IP addresses of the real BSM servers as well as the architecture of the internal network.
- The only accessible client of the Web server is the reverse proxy.
- This configuration supports NAT firewalls.
- The reverse proxy requires a minimal number of open ports in the firewall.

The reverse proxy provides good performance compared to other bastion host solutions. It is strongly recommended that you use a reverse proxy with BSM to achieve a secure architecture. For details on configuring a reverse proxy for use with BSM, see "Using a Reverse Proxy in BSM" on page 15.

If you must use another type of secure architecture with your BSM platform, contact HP Software Support to determine which architecture is the best one for you to use.

Notes and Recommendations

Notes:

- **Prerequisites.** To best use the hardening guidelines given here for your particular organization, do the following before starting the hardening procedures:
  - Evaluate the security risk/security state for your general network, and use the conclusions when deciding how to best integrate the BSM platform into your network.
  - Review the entire guide, especially Chapter 2, "Hardening Workflow" on page 11.
- **Log management**. BSM uses the log4j framework for managing log files. If you wish to change the locations of log files, these can be set in the log4j appenders, which are located in **<HPBSM root directory>\conf\core\Tools\log4j**. There is a separate directory for each process, for example **EJB** for the JBoss application server.
- **Security officer.** The security officer is a user who has security privileges to view sensitive information in the system. The security officer is typically not a regular BSM user and receives access to configure certain sensitive reporting information, such as which RUM transaction parameters to include or exclude from certain reports (For example Session Details or Session Analyzer). For details, see "Security Officer" in the BSM Platform Administration Guide.

  The Security Officer can see the parameters and decide to expose them in the reports, but once they are exposed in the reports, anyone with access to these reports will be able to see this data, so it is imperative that the application being monitored encrypts sensitive data, such as passwords, credit card numbers, and identity numbers.
- **Changing the encryption algorithm**. You can change the encryption algorithm used by BSM, but only before running the configuration wizard. Open the encryption properties file, **<HPBSM root directory>\conf\encryption.properties**, and choose one of the predefined

crypt configuration entries (**crypt.conf.x**) by setting **crypt.conf.active.id** to the appropriate index. If you want to add another entry, follow the standard Java Cryptography Extension (JCE) format.

- The hardening procedures are based on the assumption that you are implementing only the instructions provided in this guide, and not performing other hardening steps not documented here.
- Where the hardening procedures focus on a particular distributed architecture, this does not imply that this is the best architecture to fit your organization's needs.
- It is assumed that the procedures included in the hardening guide will be performed on machines dedicated to the BSM platform. Using the machines for other purposes in addition to BSM may yield problematic results.

Recommendations:

- Isolate BSM servers in their own internal segment behind a firewall since the traffic between the various BSM servers is not encrypted.
- Follow all security guidelines for LDAP servers and Oracle databases.
- Run SNMP and SMTP servers with low permissions.

Note: SNMP and mail traffic may not be secure.

Chapter 2

Hardening Workflow

This section describes the overall workflow needed to harden the HP Business Service Management environment. The procedures in this book should not be performed outside of the context of this workflow.

1. **Hardening prerequisites**
   - **Verify BSM functionality.** Verify that the BSM environment is fully functioning before starting the hardening procedures. This includes the basic data flow into and out of BSM.
   - **Define security requirements.** Before starting the hardening process, define what areas of your environment you want to secure (with SSL).
   - **Review recommendations and notes.** For details, see "Notes and Recommendations" on page 9.
2. **Obtain server certificates for the BSM virtual gateway server URLs**

   Obtain a server certificate for each of the following front-end URLs that you want to secure: one for users to access BSM, and one for data collectors to access BSM. For details, see "Issuing SSL Certificates" on page 40.

   > **Note:** If your SSL termination points are not the front-end URLs (BSM virtual gateway server URLs), you need to issue server certificates for these termination points as well.

   The server certificates must be issued into the exact FQDNs. Later, these same FQDNs must be entered into the **BSM Console > Admin > Setup and Maintenance > Infrastructure Settings** page in the following rows:
   - Default Virtual Gateway Server for Application Users URL
   - Default Virtual Gateway Server for Data Collectors URL

   For example: If your URL is **https://bsmUsers.mycompany.com:443**, you would issue a certificate to **bsmUsers.mycompany.com**.
3. **Obtain root CA certificate(s)**

   Obtain the root CA certificates from the root, and any intermediate, authorities that issued the server certificates above.
4. **Configure SSL connection using the server certificates**

   Install the server certificates on the termination points of SSL. This may be a load balancer, a reverse proxy, or a BSM Gateway server.
   a. **Load Balancer.** Install the certificates on the termination points of SSL (this is usually the load balancer.
   b. **Reverse Proxy.** Perform the procedure to configure the reverse proxy to work with SSL.

i. **IIS.** "Configure IIS Reverse Proxy to Work with SSL" on page 32

ii. **Apache.** "Configure Apache Reverse Proxy to Work with SSL" on page 21

c. **BSM Gateway servers.** Refer to the following information:

- For IIS web server. The Microsoft Web site (http://www.iis.net).
- For Apache web server. See "Configuring Apache to use SSL" on page 44.

5. **Establish trust to the Certificate Authority**

On all BSM Gateway servers, establish trust to the Certificate Authority that issued the server certificates above. If you have Service Health Analyzer, this procedure must be performed on the BSM Data Processing servers as well.

Note: The same procedure must be performed in both the JRE and JRE64 directories.

Example:

```
cd <BSM root directory>/JRE64/bin
> keytool -import -alias <myCA> -file c:\myCArootcert.cer -keystore
..\lib\security\cacerts -trustcacerts -storepass changeit
cd <BSM root directory>/JRE/bin
> keytool -import -alias <myCA> -file c:\myCArootcert.cer -keystore
..\lib\security\cacerts -trustcacerts -storepass changeit
```

6. **Verify secure connection works**

From a client browser, open the **Default Virtual Gateway Server for Application Users** and **Default Virtual Gateway Server for Data Collectors** URLs that you secured. If the login page appears, this verifies that the secure connection is configured.

7. **Update BSM Virtual URLs to use https**

Log in to BSM and enter the secured URLs in **BSM Console > Admin > Setup and Maintenance > Infrastructure Settings** page in the following two rows:

- Default Virtual Gateway Server for Application Users URL
- Default Virtual Gateway Server for Data Collectors URL

Enable and disable all BSM Gateway servers, and verify (again) that a client can log in using those URLs.

8. **Connect data collectors to secure BSM**

Now that the BSM servers are secured, you configure other servers to communicate securely with BSM.

The basic flow for any data collector connecting to secure BSM is as follows:

a. Import root CA certificate(s) obtained in step 3 into the JVM used by the data collector.

b. Configure the connection to BSM using https.

c. Make sure data flows over the secure connection.

Follow the appropriate procedures for more detailed descriptions for each of the data collectors:

Data Collector / Server type	Relevant Documentation
BPM	HP Business Process Monitor Administrator's Guide.
SiteScope	HP SiteScope Deployment Guide
System Health	Using System Health
RUM	Real User Monitor Administration
Data Flow Probe	The default UCMDB SSL port, 8443, must be changed to the BSM SSL port, 443, in the DiscoveryProbe.properties file. For more information, see the Data Flow Probe Installation Guide.
BSM Connector	BSM Connector User Guide
TransactionVision	HP TransactionVision Deployment Guide PDF

9. **Secure JBOSS Management API (http JMX) on BSM servers**

   Up to this point in the procedure, you secured access to BSM from web servers (port 80). However, the application servers (port 8080) are not secured. We recommend securing them as well. For details, see "Configuring JBoss to work with SSL" on page 54.

10. **Configure mutual SSL**

    If you want to configure BSM to require a client certificate, perform this procedure:

    a. Follow the standard procedures for requiring client certificates on the front end BSM server (could be a web server on the Gateway server, a load balancer, or a reverse proxy). For details, see the documentation of the load balancer, reverse proxy, or web server.

       For examples for reverse proxies

       IIS. "Configure IIS to Require Client Authentication - Optional" on page 34

       Apache. "Configure the Secure Reverse Proxy to Require Client Authentication - Optional" on page 23

       If your front-end server is a BSM Gateway server (i.e. you are not using a load balancer or reverse proxy), and you are using the version of Apache delivered with BSM, see "Configuring Apache to Require a Client Certificate" on page 46

    b. If users are required to log in to BSM with a digital certificate, see "How to Secure User Access to BSM Using Client-Side Authentication Certificates" in the BSM Platform Administration Guide.

    c. If users are required to log in to BSM using smart cards, see the Smart Card Authentication Configuration Guide.

d. To enable data collectors to connect to the BSM front end server that now requires a client certificate, refer to the following documentation:

Data Collector / Server type	Relevant Documentation
BSM Connector	See the BSM Connector User Guide
BPM	See the HP Business Process Monitor Administrator's Guide.
SiteScope	"Configuring SiteScope to Connect to a BSM Server That Requires a Client Certificate" in the HP SiteScope Deployment Guide.
System Health	"Configuring SiteScope to Connect to a BSM Server That Requires a Client Certificate" in the HP SiteScope Deployment Guide.
RUM	See the Real User Monitor Administration PDF.
Data Flow Probe	See the RTSM Data Flow Management Guide.

11. **(Recommended) Secure data collectors admin consoles with SSL**

This section describes how to secure access to the data collector admin consoles (UI). Follow the appropriate procedures depending on your data collectors:

Data Collector / Server type	Relevant Documentation
BPM	"Configuring Tomcat to Support HTTPS" on page 52.
SiteScope	"Configuring Tomcat to Support HTTPS" on page 52.
System Health	"Configuring Tomcat to Support HTTPS" on page 52.
RUM	"Configuring Tomcat to Support HTTPS" on page 52.
Transaction Vision	See the HP TransactionVision Deployment Guide PDF

12. **(Optional) Secure JBOSS Management API (JMX-RMI channel)**

In certain cases, you may need to secure the JMX-RMI channel used for internal BSM communications. This procedure should be performed only if there is a specific reason to do so. For details, see "Securing JMX-RMI Channel Used for Internal BSM Communications" on page 56.

13. **(Optional) Secure JMX console for other processes**

You can also secure the JMX console to work with SSL in other processes. For details, see "Configuring the JMX Console to Work with SSL in Other Processes" on page 55.

Chapter 3

Using a Reverse Proxy in BSM

This chapter describes the security ramifications of reverse proxies and contains instructions for using a reverse proxy with BSM.

This chapter discusses only the security aspects of a reverse proxy. It does not discuss other aspects of reverse proxies, such as caching and load balancing.

A reverse proxy is an intermediate server that is positioned between the client machine and the Web server(s). To the client machine, the reverse proxy seems like a standard Web server that serves the client machine's HTTP or HTTPS protocol requests with no dedicated client configuration required.

The client machine sends ordinary requests for Web content, using the name of the reverse proxy instead of the name of a Web server. The reverse proxy then sends the request to one of the Web servers. Although the response is sent back to the client machine by the Web server through the reverse proxy, it appears to the client machine as if it is being sent by the reverse proxy.

BSM supports a reverse proxy in DMZ architecture. The reverse proxy is an HTTP or HTTPS mediator between the BSM data collectors/application users and the BSM servers.

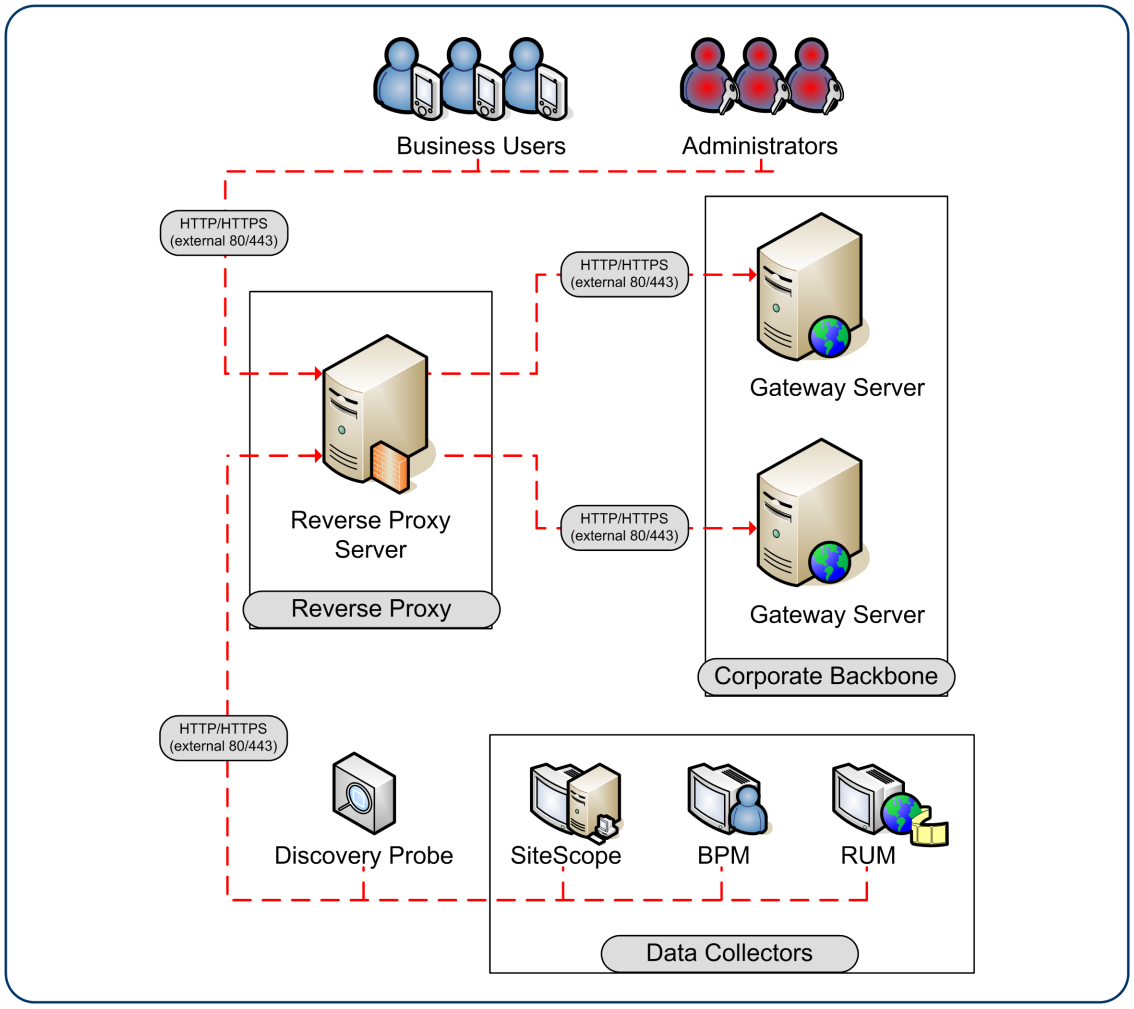
Your data collectors may access BSM through the same virtual host or a different virtual host as your application users. For example, your environment may use one load balancer for application users and one load balancer for data collectors.

Reverse Proxy Configuration

In this topology, the reverse proxy context is divided into two sections:

- Communication that is redirected to the Virtual Host for Data Collectors.
- Communication that is redirected to the Virtual Host for Application Users.

The use of a reverse proxy is illustrated in the diagram below. Your data collectors may access BSM through the same virtual host or a different virtual host as your application users. For example, your environment may use one load balancer for application users and one load balancer for data collectors.



Reverse proxy BSM support should be configured differently in each of the following cases:

Scenario #	BSM Components Behind the Reverse Proxy
1	Data collectors (Business Process Monitor, Real User Monitor, SiteScope, Data Flow Probe, BSM Connector)
2	Application users
3	Data collectors and application users

Note:

- When configuring a Reverse Proxy with TransactionVision, only one instance of the TransactionVision UI/Job Server exists, even if there are multiple Gateway Servers in your environment.

Reverse Proxy Configuration Workflow

This section describes the overall workflow for configuring a reverse proxy to work with BSM servers. The procedure differs depending on the web server of your reverse proxy.

1. If you have a load balancer that is functioning as a reverse proxy, you do not need to configure an additional reverse proxy. For details, see Load Balancing for the Gateway Server in the BSM Installation Guide.
2. Perform the relevant procedure depending on whether your reverse proxy is using the Apache or IIS web server.

   Apache. "Configuring a Reverse Proxy - Apache" below.

   IIS. "Configuring a Reverse Proxy - IIS" on page 30.
3. Configure BSM to support your reverse proxy. For details, see "HP BSM Specific Configuration" on page 34.

Configuring a Reverse Proxy - Apache

This section contains the procedures describing how to configure a reverse proxy using an apache web server.

Note: The procedures in this section should be performed as part of the Hardening Workflow. For details, see "Hardening Workflow" on page 11

This section contains the following topics:

Configure Apache to Work as a Reverse Proxy

This procedure should be performed as part of the Hardening Workflow. For details, see "Hardening Workflow" on page 11

1. Configure Apache to work as a reverse proxy.

   Apache must be manually configured to function as a reverse proxy.

   For example:

   a. Open the <Apache installation directory>\Webserver\conf\httpd.conf file.

   b. Enable the following modules:

      - LoadModule proxy_module modules/mod_proxy.so
      - LoadModule proxy_http_module modules/mod_proxy_http.so

   c. Add the following lines:

```
ProxyRequests off

<Proxy *>
       Order deny,allow
       Deny from all
       Allow from all
</Proxy>
ProxyTimeout 300
```

2. Add support for application users and data collectors as seen in the following example. For more details, see "Reference - Support for BSM Application Users" on page 26 and "Reference - Support for BSM Data Collectors" on page 29.

   Data Collectors:

```
ProxyPass              /ext                    http://DATA/ext
ProxyPassReverse       /ext                    http://DATA/ext
ProxyPass              /topaz/topaz_api        http://DATA/topaz/topaz_api
ProxyPassReverse       /topaz/topaz_api        http://DATA/topaz/topaz_api
ProxyPass              /mam-collectors         http://DATA/mam-collectors
ProxyPassReverse       /mam-collectors         http://DATA/mam-collectors
```

   Application Users:

```
ProxyPass              /mercuryam              http://USERS/mercuryam
ProxyPassReverse       /mercuryam              http://USERS/mercuryam
ProxyPass              /hpbsm                  http://USERS/hpbsm
ProxyPassReverse       /hpbsm                  http://USERS/hpbsm
ProxyPass              /topaz                  http://USERS/topaz
ProxyPassReverse       /topaz                  http://USERS/topaz
ProxyPass              /webinfra               http://USERS/webinfra
ProxyPassReverse       /webinfra               http://USERS/webinfra
```

```
ProxyPass               /filters                http://USERS/filters
ProxyPassReverse        /filters                http://USERS/filters
ProxyPass               /TopazSettings          http://USERS/TopazSettings
ProxyPassReverse        /TopazSettings          http://USERS/TopazSettings
ProxyPass               /opal                   http://USERS/opal
ProxyPassReverse        /opal                   http://USERS/opal
ProxyPass               /mam                    http://USERS/mam
ProxyPassReverse        /mam                    http://USERS/mam
ProxyPass               /mam_images             http://USERS/mam_images
ProxyPassReverse        /mam_images             http://USERS/mam_images
ProxyPass               /mcrs                   http://USERS/mcrs
ProxyPassReverse        /mcrs                   http://USERS/mcrs
ProxyPass               /rumproxy               http://USERS/rumproxy
ProxyPassReverse        /rumproxy               http://USERS/rumproxy
ProxyPass               /bpi                    http://USERS/bpi
ProxyPassReverse        /bpi                    http://USERS/bpi
ProxyPass               /odb                    http://USERS/odb
ProxyPassReverse        /odb                    http://USERS/odb
ProxyPass               /uim                    http://USERS/uim
ProxyPassReverse        /uim                    http://USERS/uim
ProxyPass               /ucmdb-api              http://USERS/ucmdb-api
ProxyPassReverse        /ucmdb-api              http://USERS/ucmdb-api
ProxyPass               /ucmdb-ui               http://USERS/ucmdb-ui
       connectiontimeout=1000 timeout=1000
ProxyPassReverse        /ucmdb-ui               http://USERS/ucmdb-ui
ProxyPass               /tv                     http://USERS/tv
ProxyPassReverse        /tv                     http://USERS/tv
ProxyPass               /tvb                    http://USERS/tvb
ProxyPassReverse        /tvb                    http://USERS/tvb
ProxyPass               /opr-admin-server/messagebroker/amfsecure
               http://USERS/opr-admin-server/messagebroker/amf
ProxyPassReverse        /opr-admin-server/messagebroker/amfsecure
               http://USERS/opr-admin-server/messagebroker/amf
ProxyPass               /opr-admin-server/messagebroker/amfpollingsecure
               http://USERS/opr-admin-server/messagebroker/amfpolling
ProxyPassReverse        /opr-admin-server/messagebroker/amfpollingsecure
               http://USERS/opr-admin-server/messagebroker/amfpolling
ProxyPass               /opr-console/messagebroker/amfsecure
               http://USERS/opr-console/messagebroker/amf
ProxyPassReverse        /opr-console/messagebroker/amfsecure
               http://USERS/opr-console/messagebroker/amf
ProxyPass               /opr-admin-server       http://USERS/opr-admin-server
ProxyPassReverse        /opr-admin-server       http://USERS/opr-admin-server
ProxyPass               /opr-console            http://USERS/opr-console
ProxyPassReverse        /opr-console            http://USERS/opr-console
ProxyPass               /opr-gateway            http://USERS/opr-gateway
ProxyPassReverse        /opr-gateway            http://USERS/opr-gateway
ProxyPass               /opr-web                http://USERS/opr-web
ProxyPassReverse        /opr-web                http://USERS/opr-web
```

```
ProxyPass              /OVPM                  http://USERS/OVPM
ProxyPassReverse       /OVPM                  http://USERS/OVPM
ProxyPass              /topaz/sitescope       http://USERS/topaz/sitescope
ProxyPassReverse       /topaz/sitescope       http://USERS/topaz/sitescope
ProxyPass              /cm                    http://USERS/cm
ProxyPassReverse       /cm                    http://USERS/cm
```

Note: If you are using IDM-SSO, you may need to add the following lines (replace siteminderagent in the syntax below with the name of your IDM-SSO vendor):

```
ProxyPass         /siteminderagent    http://USERS/siteminderage
nt
ProxyPassReverse  /siteminderagent    http://USERS/siteminderage
nt
```

3. Verify reverse proxy points to BSM
   - Restart Apache
   - Go to http://<RP>/topaz - verify that you see the BSM login page. At this point, if you enter your credentials you would see an empty page because BSM is not yet configured to work with a reverse proxy.

Configure Apache Reverse Proxy to Work with SSL

This procedure should be performed as part of the Hardening Workflow. For details, see "Hardening Workflow" on page 11

1. Convert the root CA certificate obtained earlier to base 64 format

   Openssl > x509 -in c:\ca_64.cer -out c:\ca.pem

2. Split certificate and private key

   If the server certificate is in PFX format, split the certificate. In OpenSSL run the following commands to generate both certificate and private key in PEM format:

   pkcs12 -in C:\<server_certificate>.pfx -clcerts -nokeys -out C:\mycert.pem

   Enter Import Password: <your_password>

   MAC verified OK

   pkcs12 -in C:\<server_certificate>.pfx -nocerts -nodes -out C:\mykey.pem

   Enter Import Password: <your_password>

   MAC verified OK

3. Configure Apache to use the certificates.

   a. Edit <Apache Installation Directory>/WebServer/conf/httpd.conf

      uncomment these lines (remove #):

      LoadModule ssl_module modules/mod_ssl.so

      Include conf/extra/httpd-ssl.conf

   b. Edit <Apache Installation Directory>/WebServer/conf/extra/httpd-ssl.conf

      - Update SSLCertificateFile with path to <mycert.pem >
      - Update SSLCertificateKeyFile with path to <mykey.pem>
      - Insert the following lines in the virtual host section in httpd-ssl.conf with the path to the certificate authority key in PEM format:

        VirtualHost <Reverse Proxy FQDN>

        ProxyRequests Off

        SSLProxyEngine On

        SSLProxyCACertificateFile <path to file of ca who issued the proxy certificate, for example c:\ca.pem>

        SSLProxyVerify require

        # General setup for the virtual host

4. Close port 80

   Open <Apache installation directory>\Webserver\conf\httpd.conf and comment out **listen 80** by adding # as a prefix.

5. Verify that Apache runs using SSL

   a. Restart Apache

   b. Go to https://<Reverse Proxy FQDN>.

      Do not use localhost, use the full server name that matches the name on the certificate. You should see the message "it works!"

   c. Go to http://<Reverse Proxy FQDN>.

      It should not work.

Configure the Secure Reverse Proxy to Require Client Authentication - Optional

Configuring a secure reverse proxy to require client authentication involves manual procedures

1. Make the following changes in <Apache installation directory>/conf/extra/httpd-ssl.conf:
   a. Uncomment (remove the #) the following lines:

      SSLVerifyClient require

      SSLVerifyDepth 10

   b. Search for SSLCACertificateFile, uncomment it and update the path to the client CA root certificate for the authority that issued your client certificate

      SSLCACertificateFile "C:\CA.pem"

   c. Locate the line **#SSLOptions +FakeBasicAuth +ExportCertData +StrictRequire**

      Add the following line right below it: **SSLOptions +ExportCertData**

   d. Add the following line before </VirtualHost>

      RequestHeader set CLIENT_CERT_HEADER "%{SSL_CLIENT_CERT}s"
2. Edit the <Apache installation directory>/conf/httpd.conf file

   Uncomment (remove the #) from the following lines:

   LoadModule headers_module modules/mod_headers.so

   LoadModule rewrite_module modules/mod_rewrite.so
3. Restart Apache.

   Go to https://<Reverse Proxy FQDN>/topaz

   Verify that you see a prompt for a client certificate.

Configuring BBC Port 383 Connection on Reverse Proxy

For the HPOM server to be able to forward events to the HP BSM server in the reverse proxy environment, port 383 used by the BBC protocol must be configured on the reverse proxy.

The following general steps use Apache as an example:

1. Use the utility below to issue a certificate for the ReverseProxy node. This can be done from the BSM processing server or any HPOM server, but not from the BSM gateway server.

   For example:

   ```
   ovcm -issue -file <certificate_file> -name <FQDN (fully qualified domain name) of Reverse Proxy> [-pass <passphrase>]
   ```

2. Use openssl to convert it for use by Apache reverse proxy, as in the following:

   SSLCertificateFile:
   ```
   openssl pkcs12 -in <certificate_file> -out oprcl.crt
   ```

   SSLCertificateKeyFile:
   ```
   openssl rsa -in oprcl.crt -out oprcl.pem
   ```

   SSLProxyMachineCertificateFile:
   ```
   openssl pkcs12 -in <certificate_file> -out oprcl.p12 -nodes -clcerts
   ```

   SSLCACertificateFile:

   ```
   ovcert -exporttrusted -file trusts.cer
   ```

3. Copy SSLCertificateFile, SSLCertificateKeyFile, SSLProxyMachineCertificateFile, and SSLCACertificateFile to the reverse proxy machine (in this example, to the locations `<Apache_Install_Dir>/Apache2.2/conf/oprcl.crt`, `<Apache_Install_Dir>/Apache2.2/conf/oprcl.pem`, and `<Apache_Install_Dir>/Apache2.2/conf/oprcl.p12`, respectively).

4. Modify httpd-ssl.conf to:

   a. Listen on port 383

   b. Add a virtual host section for port 383, for example:

   ```
   <VirtualHost <FQDN of Reverse Proxy>:383>
   ServerName <value of "friendlyName" in oprcl.crt>
   ServerAlias <hostname of RP>
   ServerAdmin <admin email>
   DocumentRoot "<Apache_Install_Dir>/Apache2.2/htdocs"
   ErrorLog "<Apache_Install_Dir>/Apache2.2/logs/<FQDN of Reverse Proxy>-error.log"
   TransferLog "<Apache_Install_Dir>/Apache2.2/logs/<FQDN of Reverse Proxy>-access.log"
   ProxyRequests Off
   SSLProxyEngine on
   SSLEngine on
   SSLCipherSuite ALL:!ADH:!EXPORT56:RC4+RSA:+HIGH:+MEDIUM:+LOW:+SSLv2:+EXP:+eNULL
   SSLCertificateFile "<Apache_Install_Dir>/Apache2.2/conf/oprcl.crt"
   ```

```
SSLCertificateKeyFile "<Apache_Install_Dir>/Apache2.2/conf/oprcl.pem"
SSLProxyMachineCertificateFile "<Apache_Install_Dir>/Apache2.2/conf/oprcl.p12"
SSLCACertificateFile "<Apache_Install_Dir>/Apache2.2/conf/trusts.cer"
<Proxy *>
Order deny,allow
Allow from "<DomainName> e.g. .devlab.ad"
</Proxy>
ProxyPass / "https://<FQDN of BSM Gateway>:383/"
ProxyPassReverse / "https://<FQDN of BSM Gateway>:383/"
</VirtualHost>
```

Reference - Support for BSM Application Users

The following table can be used as a reference for application users to connect via the reverse proxy.

Requests for … on the Reverse Proxy Server	Proxy Request to be Served by:
/hpbsm/*	http://[Virtual Host for Application Users]/hpbsm/* https://[Virtual Host for Application Users]/hpbsm/*
/bpi/*	http://[Virtual Host for Application Users]/bpi/* https://[Virtual Host for Application Users]/bpi/*
/filters/*	http://[Virtual Host for Application Users]/filters/* https://[Virtual Host for Application Users]/filters/*
/mam/*	http://[Virtual Host for Application Users]/mam/* https://[Virtual Host for Application Users]/mam/*
/mam_images/*	http://[Virtual Host for Application Users]/mam_images/* https://[Virtual Host for Application Users]/mam_images/*
/mcrs/*	http://[Virtual Host for Application Users]/mcrs/* https://[Virtual Host for Application Users]/mcrs/*
/mercuryam/*	http://[Virtual Host for Application Users]/mercuryam/* https://[Virtual Host for Application Users]/mercuryam/*
/odb/*	http://[Virtual Host for Application Users]/odb/* https://[Virtual Host for Application users]/odb/*
/opal/*	http://[Virtual Host for Application Users]/opal/* https://[Virtual Host for Application Users]/opal/*
/opr-admin-server/ messagebroker/amfpoll ing/*	http://[Virtual Host for Application Users]/opr-admin-server/ messagebroker/amfpolling/* https://[Virtual Host for Application Users]/opr-admin-server/ messagebroker/amfpolling**secure**/* **Note:** Append the word secure to each resource URL when using https.
/opr-admin-server/ messagebroker/amf/*	http://[Virtual Host for Application Users]/opr-admin-server/ messagebroker/amf/* https://[Virtual Host for Application Users]/opr-admin-server/ messagebroker/amf**secure**/* **Note:** Append the word secure to each resource URL when using https.

Requests for … on the Reverse Proxy Server	Proxy Request to be Served by:
/opr-console/ messagebroker/amf/*	http://[Virtual Host for Application Users]/opr-console/ messagebroker/amf/* https://[Virtual Host for Application Users]/opr-console/ messagebroker/amf**secure**/* **Note:** Append the word secure to each resource URL when using https.
/opr-admin-server/*	http://[Virtual Host for Application Users]/opr-admin-server/* https://[Virtual Host for Application Users]/opr-admin-server/*
/opr-console/*	http://[Virtual Host for Application Users]/opr-console/* https://[Virtual Host for Application Users]/opr-console/*
/opr-gateway/*	http://[Virtual Host for Application Users]/opr-gateway/* https://[Virtual Host for Application Users]/opr-gateway/*
/opr-web/*	http://[Virtual Host for Application Users]/opr-web/* https://[Virtual Host for Application Users]/opr-web/*
/OVPM/*	http://[Virtual Host for Application Users]/OVPM/* https://[Virtual Host for Application Users]/OVPM/*
/rumproxy/*	http://[Virtual Host for Application Users]/rumproxy/* https://[Virtual Host for Application Users]/rumproxy/*
/topaz/*	http://[Virtual Host for Application Users]/topaz/* https://[Virtual Host for Application Users]/topaz/*
/TopazSettings/*	http://[Virtual Host for Application Users]/TopazSettings/* https://[Virtual Host for Application Users]/TopazSettings/*
/tv/*	http://[Virtual Host for Application Users]/tv/* https://[Virtual Host for Application Users]/tv/*
/tvb/*	http://[Virtual Host for Application Users]/tvb/* https://[Virtual Host for Application Users]/tvb/*
/ucmdb-api/*	http://[Virtual Host for Application Users]/ucmdb-api/* https://[Virtual Host for Application users]/ucmdb-api/*

Requests for … on the Reverse Proxy Server	Proxy Request to be Served by:
/ucmdb-ui/*	http://[Virtual Host for Application Users]/ucmdb-ui/* https://[Virtual Host for Application users]/ucmdb-ui/* Note: If you are using a Reverse Proxy and you have an integration with HP Universal CMDB, make sure your reverse proxy timeout setting is at least 1000 seconds. For example, in your reverse proxy http.conf file, modify the line that starts with ProxyPass as follows: ProxyPass /ucmdb-ui http://<my BSM GW server>/ucmdb-ui connectiontimeout=1000 timeout=1000
/uim/*	http://[Virtual Host for Application Users]/uim/* https://[Virtual Host for Application Users]/uim/*
/webinfra/*	http://[Virtual Host for Application Users]/webinfra/* https://[Virtual Host for Application Users]/webinfra/*

Reference - Support for BSM Data Collectors

The following table can be used as a reference for data collectors to connect via the reverse proxy.

Requests for... on the Reverse Proxy Server	Proxy Request to be Served by:
/topaz/topaz_api/*	http://[Virtual Host for Data Collectors]/topaz/topaz_api/* https://[Virtual Host for Data Collectors]/topaz/topaz_api/*
/topaz/sitescope/*	http://[Virtual Host for Data Collectors]/topaz/sitescope/* https://[Virtual Host for Data Collectors]/topaz/sitescope/*
/ext/*	http://[Virtual Host for Data Collectors]/ext/* https://[Virtual Host for Data Collectors]/ext/*
/cm/*	http://[Virtual Host for Data Collectors]/cm/* https://[Virtual Host for Data Collectors]/cm/*
/mam-collectors/*	http://[Virtual Host for Data Collectors]/mam-collectors/* https://[Virtual Host for Data Collectors]/mam-collectors/*
/tv/*	http://[HP TransactionVision UI/Job Server]: 21000/tv/* https://[HP TransactionVision UI/Job Server]: 21001/tv/* **Note:** If you want to use AJP to enable the Reverse Proxy server to communicate with the HP TransactionVision UI/Job Server, use the following: http://[HP TransactionVision UI/Job Server]: 21002/tv/*
/axis2/*	http://[Virtual Host for Data Collectors]/axis2/* https://[Virtual Host for Data Collectors]/axis2/* **Note:** Required if SOAP adaptor is used with embedded Run-time Service Model (RTSM) for replication into secure BSM via reverse proxy.

Note:

- Make sure your reverse proxy supports priority handling logic, which enables a specific expression to be handled before a more generic one, if required. For example, the **/topaz/topaz_api/*** expression must be handled before the **/topaz/*** expression.
- For some reverse proxies, a reverse pass is also required. The reverse pass changes the HTTP or HTTPS headers returned from the server to relative headers. For an example of a reverse pass, see "Configure Apache to Work as a Reverse Proxy " on page 18.

Configuring a Reverse Proxy - IIS

This section contains the procedure describing how to configure a reverse proxy using an IIS web server. Procedures describing steps that are performed in products other than BSM are for example purposes only.

Note: The procedures in this section should be performed as part of the Hardening Workflow. For details, see "Hardening Workflow" on page 11

This section contains:

Configure IIS to Work as a Reverse Proxy

This procedure may differ depending on your version of IIS.

For example:

1. Install the Application Request Routing (ARR) extension. For details, see http://www.iis.net/downloads/microsoft/application-request-routing.
2. Open the IIS Manager.
3. Create a new IIS web site, or use the default web site.
4. Create a new IIS Server Farm named BSM.
   a. Add a new server to the farm with the IP of your BSM Gateway server.
   b. When prompted, allow it to create a URL rewrite rule.
5. Enable IIS to function as a proxy.
   a. Select the main tree node (server name) > Application Request Routing Cache > Server Proxy Settings.
   b. Check the **Enable proxy** box.
   c. Set the **HTTP version** to **Pass through**.
   d. Check the **Reverse rewrite host in response headers** box.
   e. Click **Apply**.
6. Verify reverse proxy points to BSM

   Go to http://<Reverse Proxy FQDN>/topaz - verify that you see the BSM login page. At this point, if you enter your credentials you would see an empty page because BSM is not yet configured to work with a reverse proxy.

Configure IIS Reverse Proxy to Work with SSL

Note: The procedures in this section should be performed as part of the Hardening Workflow. For details, see "Hardening Workflow" on page 11

1. Establish trust on the reverse proxy to the CA that issued the server certificate

   Import the CA root certificate of the authority that issued the server certificate for this server into the computer truststore using mmc

   For example:

   a. From the reverse proxy, open the Microsoft Management Console (Run > mmc).

   b. Add a snapin (File > Add / Remove snapin).

   c. Select Certificates and click Add.

   d. Select Computer Account and click Next.

   e. Select Local Computer and click Finish.

   f. Click OK.

   g. Import the certificate

      Import ca.cer into the Trusted Root Certificate Authorities list.

2. Import the server certificate to the Microsoft Management Console

   Import the server certificate you obtained earlier into Personal > Certificates in the Microsoft Management Console.

3. Enable SSL on IIS

   For example:

   a. In the IIS Manager, select your web site.

   b. In the actions pane, select Bindings

   c. Add an HTTPS binding for port 443

   d. Specify your server certificate in the SSL Certificate field.

4. Configure the Reverse Proxy to Require SSL

   For example:

   a. In the IIS Manager, select your web site, and select **SSL settings**.

   b. Check the **Require SSL** checkbox.

5. Configure SSL Offloading

   If your SSL terminates on the reverse proxy, perform the following steps:

a. Run the following command to configure IIS to allow large data samples (1 MB) to pass through:

   C:\Windows\System32\inetsrv>appcmd.exe set config -section:system.webserver/serverruntime /uploadreadaheadsize:1048576 /commit:apphost

b. In the ISS Manager, Select the main tree node (server name) > Application Request Routing Cache > Server Proxy Settings

c. Check the **enable SSL offloading** checkbox.

Configure IIS to Require Client Authentication - Optional

1. Recreate the SSL binding to enable client negotiation

   The previous binding will function, but may have performance issues. This binding enables negotiation, thereby increasing performance when using client authentication.

   a. Remove the current binding using the IIS manager user interface

   b. Run the following commands from the IIS server:

   c:\windows\system32\inetsrv\appcmd set site /site.name:"Default Web Site" /+bindings.[protocol='https',bindingInformation='*:443:']

   netsh http add sslcert ipport=0.0.0.0:443 certhash=<your server certificate hash> appid={00112233-4455-6677-8899-AABBCCDDEEFF} clientcertnegotiation=enable

   > **Note:** You can find the certificate hash from mmc by viewing the thumbprint in the details of the certificate.

2. Configure the Reverse Proxy to Require a Client Certificate

   > **For example:**
   >
   > a. In the IIS Manager, select your web site, and select **SSL settings**.
   >
   > b. In **Client certificates**, select **Require**.

3. Specify the header the reverse proxy passes to BSM for client certificate authentication in base64 format

   > **For example:**
   >
   > a. From the IIS manager, select your farm and select **Proxy**.
   >
   > b. Select the checkbox **Reverse rewrite host in response header**.
   >
   > c. In the field **forward encoded client certificate in the following header**, enter the header name **CLIENT_CERT_HEADER**.
   >
   > d. Click **Apply**.

HP BSM Specific Configuration

In addition to configuring the reverse proxy to work with BSM, you must configure BSM to work with the reverse proxy.

> **Note:** BSM must be configured only if application users are connected via a reverse proxy to BSM. If the reverse proxy is being used for data collectors only, skip the instructions in this section.

To configure BSM to work with the reverse proxy:

1. Select **Admin > Platform > Setup and Maintenance > Infrastructure Settings**. Click **Foundations** and select the **Platform Administration** context from the drop-down box.
2. In the Platform Administration - Host Configuration pane, set the following parameters:
   - **Default Virtual Gateway Server for Application Users URL and Default Virtual Gateway Server for Data Collectors URL.** Verify that these parameters represent the URL of the machine (reverse proxy, load balancer, or other type of machine) used to access the Gateway server machine. For example, `http://my_reverse_proxy.example.com:80`.

     If you are using a NAT device to access the Gateway server, enter the full URL of the NAT device. For example, `http://nat_device.example.com:80`.

     Local Virtual Gateway Server for Application Users URL and Local Virtual Gateway Server for Data Collectors URL (optional). If you must use more than one URL (the ones defined for the Default Virtual Server URLs, above) to access the Gateway server machine, define a Local Server URL for each machine through which you want to access the Gateway server machine. For example, `http://my_specific_virtual_server.example.com:80`.

     If the **Local Virtual Services Server URL** parameter is defined for a specific machine, this URL is used instead of the **Default Virtual Services URL** for the specifically-defined machine.
   - **Direct Gateway Server for Application Users Server URL**. Click the **Edit** button and delete the URL in the **value** field.
   - **Direct Gateway Server for Data Collectors URL**. Click the **Edit** button and delete the URL in the **value** field.
3. In the Reverse Proxy Configuration pane, set the following parameters:
   - **Enable Reverse Proxy**. Set this parameter to true. Note that this must be done after the above parameters have been configured.
   - **HTTP or HTTPS Reverse Proxy IPs** . Enter the internal IPs the reverse proxies and load balancers used to communicate with the Gateway server machine.

     If the IP address of the reverse proxy sending the HTTP/S request is included, the URL returned to the client is either the **Default Virtual Server URL** or the **Local Virtual Server URL** (when defined). If the IP address of the reverse proxy sending the HTTP/S request is not included, the Gateway server machine returns the base URL that it receives in the HTTP/S request.

     To find the internal IP of your reverse proxy or load balancer:
     - Log in to BSM through the reverse proxy or load balancer.
     - Open the log in the following location **<BSM Gateway Server>\log\EJBContainer\UserActionsServlet.log**.
     - The IP that appears in the latest **login** line in this log is the reverse proxy or load balancer IP. The entry should have your user name.

4. Increase the reverse proxy timeout.
5. Restart the HP BSM service on the BSM Gateway and Data Processing servers.

Note: Once you change the BSM base URL, it is assumed that the client is initiating HTTP or HTTPS sessions using the new base URL. You must therefore ensure that the HTTP or HTTPS channel from the client to the new URL is enabled.

Notes and Limitations

BSM requires your reverse proxy to have a timeout of at least 300 seconds. This is the default for some versions of Apache, but it may have been reduced. For some processes such as installing a content pack, the timeout should be as high as 1000 seconds (see "Configure Apache to Work as a Reverse Proxy " on page 18).

If you configured BSM to work in Generic Mode, all the BSM clients must access the BSM machine via the reverse proxy.

Specific and Generic Reverse Proxy Mode Support for BSM

BSM servers reply to application users by sending a base URL that is used to calculate the correct references in the HTML requested by the user. When a reverse proxy is used, BSM must be configured to return the reverse proxy base URL, instead of the BSM base URL, in the HTML with which it responds to the user.

If the reverse proxy is being used for data collectors only, configuration is required only on the data collectors and reverse proxy, and not on the BSM server(s).

There are two proxy modes that control user access to BSM servers:

- "Specific Mode" on the next page.
- "Generic Mode" on page 38.

Specific Mode

This mode should be used if you want to concurrently access BSM servers through specific reverse proxies and by direct access. Accessing the server directly means that you are bypassing the firewall and proxy because you are working within your intranet.

If you are working in this mode, each time an application user's HTTP/S request causes BSM to calculate a base URL, the base URL is replaced with the value defined for either the **Default Virtual Server URL** or the **Local Server URL** (when defined), if the HTTP/S request came through one of the IP addresses defined for the **HTTP** or **HTTPS Reverse Proxy IPs** parameter. If the HTTP/S request did not come through one of these IP addresses, the base URL that BSM receives in the HTTP/S request is the base URL that is returned to the client.

Generic Mode

This mode is used when you try to access the Gateway server via the reverse proxy. Any URLs requested are rewritten and sent back with the virtual IP of the Gateway server.

If you are working in this mode, each time an HTTP/S request causes the BSM application to calculate a base URL, the base URL is replaced with the value defined for either the **Default Virtual Server URL** or the **Local Virtual Server URL** (when defined).

Note that when using this mode, you must ensure that all BSM clients are accessing the BSM servers via the URL defined for the **Default Virtual Server URL** or the **Local Virtual Server URL** parameters.

Chapter 4

Using SSL in BSM

Overview of SSL

Secure Sockets Layer (SSL) technology secures communication by encrypting data and providing authentication. Without SSL encryption, packets of information travel over networks in full view.

SSL encryption uses two keys:

- **Public key.** The public key is used to encrypt data.
- **Private key.** The private key is used to decipher data.

Both keys together are called a **certificate**. Every SSL certificate is created for a particular server in a specific domain by a Certificate Authority (CA). When an application user or data collector accesses a BSM server, SSL authenticates the server, and can also be configured to authenticate the client. Additionally, BSM establishes an encryption method and a unique key for the communication session.

The BSM platform fully supports the SSL 3.0 protocol. The SSL channel is configured on the BSM servers/clients as required.

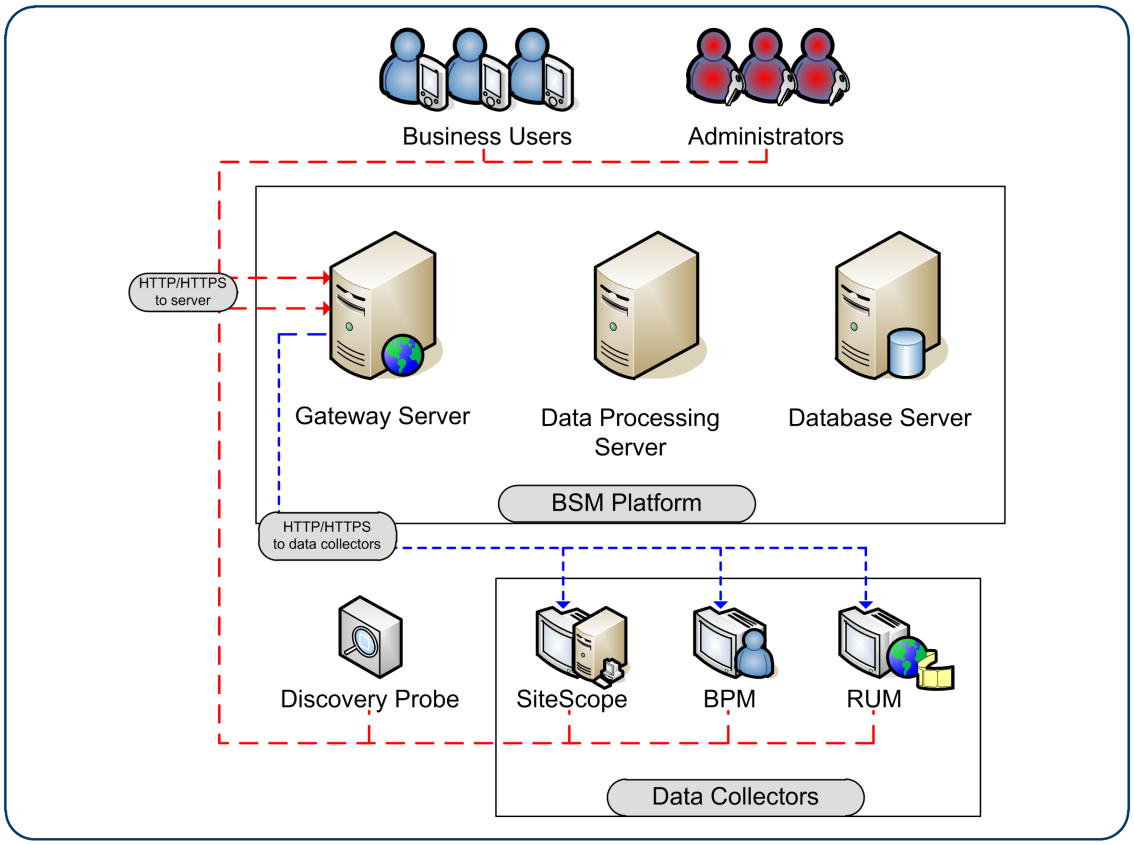
Note: We recommend using the strongest currently available cryptographic algorithms when obtaining server or client certificates, as well as the largest key size (not less than 2048-bit RSA keys). To see the latest NIST approved cryptographic algorithms and key lengths, go to http://csrc.nist.gov/publications/PubsFIPS.html.

Overview of SSL and BSM

SSL provides BSM with the following:

- **Server authentication.** Provides authentication of the BSM server used for communication.
- **Client authentication (optional).** Provides authentication of the client communicating with the BSM server. The client could be an application user or a data collector such as Business Process Monitor.
- **Encrypted channel.** Encrypts the communication between the client and the server using a variety of ciphers.
- **Data integrity.** Helps ensure that the information sent by one side over SSL is the same information received by the other side.

Possible SSL channels in BSM are illustrated in the following diagram:



Communication channels between BSM servers, data collectors, application users, and BSM platform components use various protocols on specific ports. For details, see "Port Usage" in the BSM Platform Administration Guide.

Issuing SSL Certificates

Secure communication via https can terminate either at the load balancer/ reverse proxy or on the BSM Gateway.

If it terminates on the BSM Gateway, the web server on the Gateway is configured to support/require SSL. Otherwise, if SSL terminates on the load balancer/reverse proxy, then only the load balancer/reverse proxy needs to be configured for secure communication.

Generally, server certificates must be issued to the name of the external access point (FQDN) that is configured in **Default Virtual Gateway Server for Application Users/Data Collectors URL**. This is the name that users and data collectors use to access BSM.

Note: When using aliases (for example, one name for users, one for data) on the same BSM Gateway Server, you can obtain a Subject Alternative Name (SAN) certificate with a predefined set of DNS names.

If there is a load balancer/reverse proxy in front of a BSM gateway, it is recommended to have SSL terminate on the load balancer/reverse proxy.

As usual with SSL, you will need to have a CA root certificate present in your browser's **Trusted Certification Authorities** list and in the trustcacerts of the JVM on each data collector installation.

The following table addresses SSL termination in the High Availability environment:

SSL Termination On	SSL on Load Balancer	SSL on Gateway	Advantages/ Disadvantages
Load Balancer	Yes	No	This is a recommended configuration. It allows: • Maintenance of certificates in one place (on load balancer/reverse proxy) • Reduced processing of load on BSM Gateways On each load balancer/reverse proxy, use server certificates issued to the name of the external access point (FQDN) that users/data collectors are using to access BSM. If multiple load balancers/reverse proxies share the load, each one must have these certificates imported.
Gateway	Yes	Yes	This is a less ideal configuration, especially where load balancers are concerned. It requires: • Maintenance of certificates in multiple places (load balancer/reverse proxy and Gateways) • Expensive SSL renegotiation in load balanced environment for data collectors (see note below) In this configuration, in addition to installing certificates on the load balancer, also install server certificates on the Gateway, using a server certificate issued to the FQDN name of the Gateway. **In a high availability environment with multiple Gateways:** Traffic from the same data collector will be load-balanced between different Gateways using a round-robin mechanism. If you have a different certificate on each Gateway issued to a different name, in the worst case scenario, switching between Gateways will require an SSL renegotiation process to run each time there is a switch between Gateways. This is very expensive in terms of CPU use and network traffic, on both the server and client sides. For this reason, SSL termination is typically done on the load balancer.
Gateway	No	Yes	Not a recommended scenario.

SSL-Supported Topologies in BSM

SSL optional topologies in BSM are divided into two main categories:

- Application users that communicate with BSM Gateway Servers using SSL.
- Data collectors that communicate with BSM Gateway Servers using SSL.

Client authentication using a client-side certificate is optional with BSM clients.

Configuring BSM to Work with SSL

To configure a BSM Gateway Server (or a BSM machine, in the case of a single machine installation) to support SSL, you must enable SSL support on the Web server used by the Gateway Server.

To enable SSL support on the Web Server:

- **Microsoft Internet Information Server (IIS).** See Microsoft's site http://www.iis.net/ for information on enabling SSL for all interaction with the Web server. Note that SSL should be enabled for the entire IIS Web Site under which you installed the BSM applications.
- **Apache HTTP Server 2.2.x**. The Apache web server is included in BSM. For details about configuring SSL, see "Configuring Apache to use SSL" on page 44.

If you are not using a publicly known Certificate Authority for your server certificate, you need to set the Java truststore to trust the Certificate Authority that issued the server certificate. For details, see step 5 in the "Hardening Workflow" on page 11.

After performing the above procedures, the Web server installed on the Gateway Server machine is configured to support HTTPS communication.

To disable weak ciphers on IIS, refer to http://support.microsoft.com/kb/187498/en-us.

To configure the URL for accessing BSM with SSL:

1. Select **Admin > Platform > Setup and Maintenance > Infrastructure Settings**. Click **Foundations** and select **Platform Administration**.
2. In the Host Configuration pane, set the following parameters:
   - Default Virtual Gateway Server for Application Users URL and Default Virtual Gateway Server for Data Collectors URL. You must enter the server URL with the SSL protocol https and the SSL port (default is 443). For example: https://my_server.example.com:443
   - Local Virtual Gateway Server for Application Users URL and Local Virtual Gateway Server for Data Collectors URL (optional). If you must use more than one URL (the one defined for the Default Virtual Core Server URL parameter) to access the Gateway Server machine, define a Local Core Centers Server URL for each machine through which you want to access the Gateway Server machine. For example:

     https://my_specific_virtual_server.example.com:443

     Note: If the Local Virtual Core Services Server URL parameter is defined for a specific

machine, this URL is used instead of the Default Virtual Core Services URL for the specifically-defined machine. If the Local Virtual Server URL parameter is defined for a specific machine, this URL is used instead of the Default Virtual Server URL for the specifically-defined machine.

3. **Direct Gateway Server for Application Users Server URL**. Click the **Edit** button and delete the URL in the **Value** field.
4. **Direct Gateway Server for Data Collectors URL**. Click the **Edit** button and delete the URL in the **Value** field.
5. Restart the HP BSM service on all BSM machines.

Note: Once you change the BSM base URL, it is assumed that the client is initiating HTTP or HTTPS sessions using the new base URL. You must therefore ensure that the HTTP or HTTPS channel from the client to the new URL is enabled.

Configuring Apache to use SSL

If you are using an Apache web server on the BSM Gateway server, and you decide to use SSL, you must configure the web server as described in this section. For more information, see http://httpd.apache.org/docs/2.2/ssl/.

1. Prepare the server certificate
   a. Obtain a signed server certificate from your certificate authority to the name of the BSM Gateway server. Typically this certificate comes in PKCS#12 format with a password protected private key.
   b. Separate the private key and the server public key using the openssl utility.

      For example: Go to **HPBSM\WebServer\bin**, run openssl, and use the following commands:

      ```
      pkcs12 -in c:\bsmcert.pfx -clcerts -nokeys -out c:\bsm_server_cert.pem
      pkcs12 -in c:\bsmcert.pfx -nocerts -nodes -out c:\bsm_server_key.pem
      ```

2. Update the Apache SSL configuration file
   a. Go to **<BSM Gateway Installation Directory>\WebServer\conf\extra**
   b. Open **httpd-ssl.conf** in a text editor.
   c. Look for the following lines and replace the file name in quotation marks with the path to the files produced in the previous step.

      ```
      SSLCertificateFile "c:/bsm_server_cert.pem"
      SSLCertificateKeyFile "c:/bsm_server_key.pem"
      ```

   d. Locate the line starting with **ServerName** and verify that this is the name that you issued the server certificate to.
   e. Close and save file.
3. Enable SSL
   a. Go to **<BSM Gateway Installation Directory>\WebServer\conf**
   b. Open **httpd.conf** in a text editor.
   c. Search the file for the string ssl to locate and uncomment the following lines (they are not consecutive):

      ```
      LoadModule ssl_module modules/mod_ssl.so

      Include conf/extra/httpd-ssl.conf
      ```

   d. Close and Save file.
4. Restart the Apache web service

a. In Windows, go to **Start > Run** and type **services.msc**.

b. Locate **HP Business Service Management Web Server**

c. Restart the Service

d. Test your https connection to the BSM Server to make sure you can log in. For example: **https://<BSM Gateway Server>/topaz**.

e. When you have verified that the https connection works, close the http port by commenting out the line **Listen 80** in the **<BSM Gateway Installation Directory>\WebServer\conf\httpd.conf** file.

Configuring Apache to Require a Client Certificate

This procedure is used if the connection to BSM requires a client certificate. It assumes that the Apache web server is already configured for SSL.

1. Obtain the CA root certificate from the Certificate Authority that issues your client certificates. This certificate needs to be in .pem (Base64 encoded) certificate format.
2. Open **<BSM Gateway installation directory>/Webserver/conf/extra/httpd-ssl.conf**
3. Search for **SSLVerify** and uncomment the following lines (by removing the '#').

   SSLVerifyClient require

   SSLVerifyDepth <number>
4. Search for **SSLCACertificateFile** and update the path to the CA root certificate.

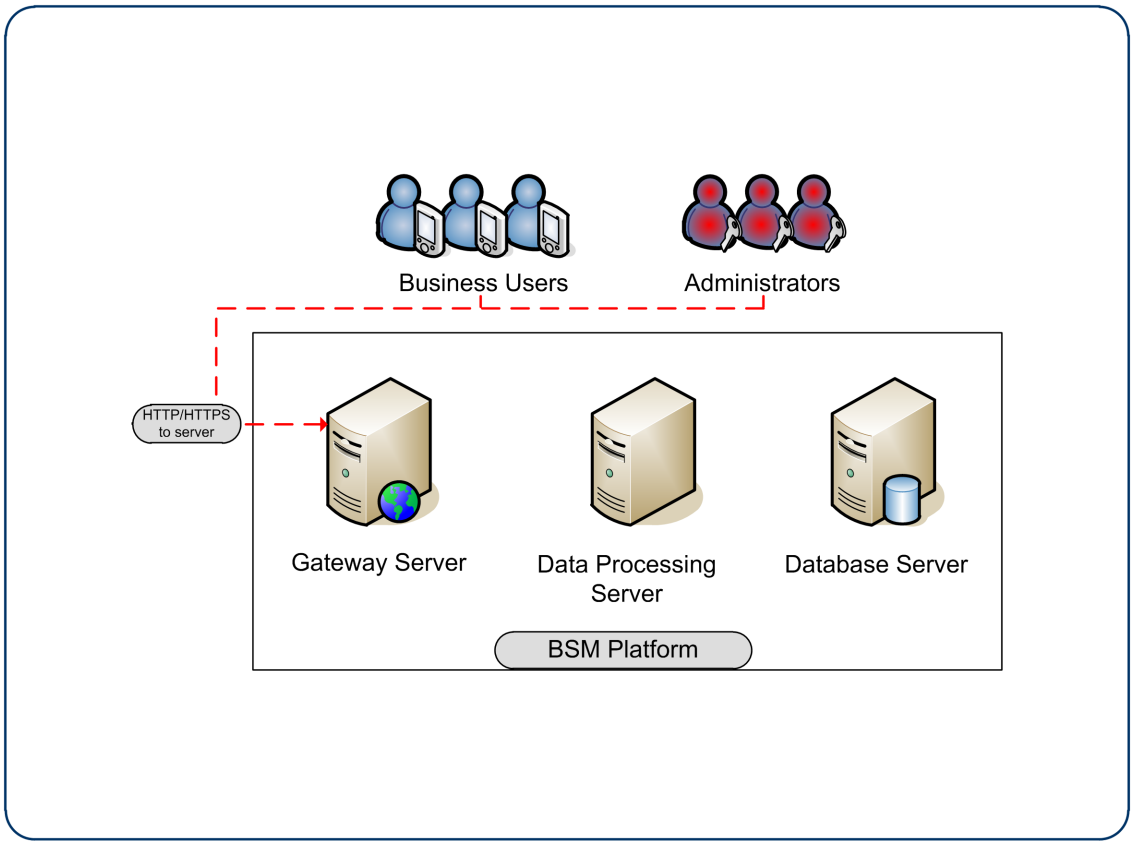
   For example, **SSLCACertificateFile "C:\ca_root.pem"**
5. Search for **#SSLOptions** and add the following line below it:

   SSLOptions +ExportCertData
6. Restart the Apache service.
7. Make sure you see a prompt for a client certificate when opening the following URL:

   https://<BSM Gateway Server>/topaz

Configuring SSL from Application Users to the Gateway Server

The instructions in this section describe how to enable SSL from the application users to the Gateway Server.


Business Users
Administrators
HTTP/HTTPS to server
Gateway Server
Data Processing Server
Database Server
BSM Platform

SSL Configuration for the Application Users

BSM application users (Gateway Server clients) use Web browsers to communicate with the Gateway Server. The Web browsers can be configured to support SSL.

When a session is started between the browser and the Gateway Server, the Gateway Server's Web server sends the browser a server-side certificate that was issued by a Certification Authority (CA). If the certificate used by the Web server is issued by a known CA, the certificate can generally be validated by the browser and no configuration is required. However, if the CA is not trusted by the browser, the browser machine must be configured to validate the server-side certificate that is sent. For instructions on setting CA certificate recognition in the browser and configuring browser certificate validation, refer to your browser vendor documentation.

For example, if you are working with Internet Explorer 7.0, you can import a certificate to the truststore used by the browser.

To import a certificate to the truststore used by the browser:

1. Select **Tools > Internet Options** and click the **Content** tab.
2. Click the **Certificates** button.
3. In the **Trusted Root Certification Authorities** tab, click **Import**.
4. Link to the certificate you want to trust and import it.

Note: You can import one of the following to the truststore:

- The Gateway Server's certificate.
- The certificate of the Certificate Authority (CA) that issued the Gateway Server's certificate.

If you do not import the CA's certificate, you must import the certificate of each individual Gateway Server that you are working with.

If you are not using a publicly known Certificate Authority (CA), you must import your own CA root certificate into the truststore of BSM's JVM for communicating with the data collectors over SSL.

Handling Security Certificate Expiration

If the webserver on BSM Gateway is configured for SSL and the server certificate expires, perform the following steps:

1. Change the webserver configuration files to use a new certificate:
   - **IIS:** Import the new certificate.
   - **Apache**: Update **httpd-ssl.conf** to use new certificate files.
2. Restart the webserver (IIS or Apache service).
3. Make sure you get no certificate errors when accessing the BSM user interface through the https protocol.

SSL Certificates

Server certificates can be obtained in various formats. Java uses a proprietary format (JKS) to store certificates in what is called a Keystore. This format is compatible with Java applications. Certificates can also be stored in other language-neutral formats such as PKCS#12.

Different components support different server certificate formats. For example, web-servers such as IIS and Apache work with PKCS#12 format and do not work with JKS format. Depending on the components included on your BSM server, you may need to use either the JKS or PKCS#12 format.

For details see, "Creating a Keystore" on page 51 and "Creating a PFX/PKCS#12 certificate" on the next page.

Creating a PFX/PKCS#12 certificate

The most common format for obtaining certificates from the Certificate Authority (CA). This is a container that contains the server certificate public and private keys. In addition it can contain the whole certificate chain of root CA and all intermediate CAs. When requesting such certificate from your CA, ask for the private key to be marked as exportable, and export it password-protected.

Creating a Keystore

Java uses a proprietary format (JKS) to store certificates in what is called a Keystore. This format is compatible with Java applications. Certificates can also be stored in other language-neutral formats such as PKCS#12. We recommend researching the best format for your environment.

There are several places in BSM where you may need to point to a Java keystore containing a client or server certificate.

Example use cases:

- A Java keystore with a client certificate is used when configuring mutual SSL.
- A Java keystore with a server certificate is used when securing the JMX console as well as the JMX-RMI channel.

Option 1: Convert a PKCS#12 certificate provided by your Certificate Authority.

1. Request a client or server certificate from CA in the name of your server.
2. Export private key with a password that is at least six characters long. Example: **changeit**.
3. Convert the certificate from PFX/PKCS#12 to JKS format. For example: **keytool.exe -importkeystore -srckeystore c:\certificate.pfx -destkeystore c:\certificate.jks -srcstoretype PKCS12**
4. Import CA root certificate into the keystore just created, as in the following example.

   Download CA root certificate in BASE-64 format, for example, **c:\ca_root.cer**.

   Import CA root certificate into the keystore:
   keytool -import -alias ca -file c:\ca_root.cer -keystore C:\certificate.jks -storepass changeit

Option 2: Create a keystore in JKS format manually and have it signed by your certificate authority as follows:

1. Generate a keystore with a private key

   ```
   keytool.exe -genkeypair -validity 1065 -keysize 2048 -keyalg rsa -keystore mykeystore
   -storepass changeit -alias myserver.mydomain
   ```

   Where validity (in days) and keysize depend on your certificate authority requirements.
2. Generate a server certificate request to have it signed by your certificate authority.

   ```
   keytool.exe -keystore mykeystore -storepass changeit -alias myserver.mydomain  -certr
   eq  -file CERTREQFILE.csr
   ```
3. Download the signed server certificate **cert_signed.cer** from your certificate authority.
4. Obtain the root authority certificate (and any intermediate authority certificates if applicable).
5. Import the root certificate authority certificate (and any intermediate authority certificates if

applicable) into the keystore created earlier in this procedure.

```
keytool.exe -import -trustcacerts -keystore mykeystore -storepass changeit -alias  my
RootCA -file c:\ca_root.cer
```

6. Import the signed certificate into the same keystore under the original alias.

```
keytool -import -v -alias myserver.mydomain -file cert_signed.cer -keystore mykeystor
e -keypass changeit -storepass changeit
```

7. Verify that the keystore contains at least two entries: **Trusted Cert Entry** and **Private Key Entry**.

```
keytool -list -keystore mykeystore
```

Note: Make sure that your private key password and keystore password are the same.

Configuring Tomcat to Support HTTPS

This section describes the procedure for configuring Apache Tomcat 5.x to support HTTPS on SiteScope, RUM, BPM, and BSM Connectorservers. **This procedure should not be performed on BSM Gateway or Data Processing servers.**

The procedure below is based on Tomcat 5.x.

To configure Tomcat 5.x to support HTTPS:

1. This procedure assumes that you have already obtained a server certificate for your server in either PKCS#12 or JKS format. If you have not done so, do so at this time. For details, see "SSL Certificates" on page 49.
2. Locate the server.xml file used by your Tomcat. Search for a connector with port 8443 in server.xml file, such as
`<!--<Connector port="8443" .....scheme="https" ...../>-->`,
and uncomment it.
3. Add the following attribute to the connector element:

   `keystoreFile="myKeyStore"`

   where **myKeyStore** is the JKS or PFX/PKCS#12 file that contains the Web server certificate and a corresponding private key.
4. Change the keystore type and password accordingly in the connector element:
   - keystorePass="your password"
   - keystoreType="jks" or "pkcs12"

   For example: **keystoreFile="c:\myserver.pfx" keystorePass="password for the private key" keystoreType="PKCS12"**
5. Restart Tomcat.
6. Test the SSL connection. If it is satisfactory, close the default port, leaving only the SSL

connection open. To do this:

Locate the XML Connector with **redirectPort 8443**, and comment it out. For example, change:

```
<Connector className="org.apache.catalina.connector.http.
HttpConnector" port=<default_port> minProcessors="5"
maxProcessors="75" enableLookups="true" redirectPort="8443"
acceptCount="10" debug="0" connectionTimeout="60000"/>
```

to:

```
<!--<Connector className="org.apache.catalina.connector.http.
HttpConnector" port=<default_port> minProcessors="5"
maxProcessors="75" enableLookups="true" redirectPort="8443"
acceptCount="10" debug="0" connectionTimeout="60000"/>-->
```

where **<default_port>** has the following values:

- For SiteScope: 8080
- For Business Process Monitor: 2696
- For Real User Monitor: 8180

Configuring Tomcat to Require Client-Side Certificates

This section describes the procedure for configuring Tomcat to require a client certificate on SiteScope, RUM, BPM, and BSM Connector servers. **This procedure should not be performed on BSM Gateway or Data Processing servers.**

1. Tomcat requires that the keystore containing client certificate be in .jks format. If your keystore is not in .jks format, convert your .pfx certificate to .jks.
2. Set **keystoreType="JKS"** and **clientAuth="true"**, as in the following example:

```
<Connector port="8443" maxHttpHeaderSize="8192"
maxThreads="150" minSpareThreads="25" maxSpareThreads="75"
enableLookups="false" disableUploadTimeout="true"
acceptCount="100" scheme="https" secure="true"
clientAuth="true" sslProtocol="TLS"
keystoreType="JKS"  keystoreFile="C:\Certificates\server_with_changeit_key.jks"   key
storePass="changeit"
truststoreFile="D:\Program Files\HP\BPM\JRE6\lib\security\cacerts"   truststorePass="
changeit"/>
```

Configuring JBoss to work with SSL

This task describes how to configure the application server (JBoss) to work with SSL.

This procedure should be repeated for every BSM Gateway, DPS, and one-machine server.

1. Obtain or create the server certificate in one of the following methods:
   - **Option 1 - PKCS12 Format:** Obtain the server certificate from your corporate Certificate Authority in .pfx (PKCS12) format and skip to step 2.
   - **Option 2 - JKS Format:** Create a java keystore with the server certificate. For details, see "Creating a Keystore" on page 51.
2. Modify the file server.xml.
   a. Open the file
   <HPBSM root directory>\EJBContainer\server\mercury\deploy\jboss-web.deployer\server.xml
   b. Locate the following section and replace the value of address with **127.0.0.1**.

```
<Connector port="8080" address="${jboss.bind.address}" maxThreads="250"
maxHttpHeaderSize="8192" emptySessionPath="false" protocol="HTTP/1.1"
enableLookups="false" redirectPort="29443" acceptCount="100"
connectionTimeout="20000" disableUploadTimeout="true"
URIEncoding="UTF-8" />
```

   c. Uncomment the section with Connector port="**29443**":

```
<--!
<Connector port="29443" protocol="HTTP/1.1" SSLEnabled="true"
maxthreads="150" scheme="https" secure="true"
clientAuth="false" sslProtocol="TLS" />
-->
```

d. In the same section, add information about your keystore (location, password, type). If your server certificate is in PKCS12 format, the keystore type should be "**PKCS12**". Otherwise, it should be "**JKS**". For example:

```
keystoreFile="<path to keystore>" keystoreType="JKS"
keystorePass="<private key password>"
```

The section should now look similar to this:

```
<Connector port="29443" protocol="HTTP/1.1" SSLEnabled="true"
maxthreads="150" scheme="https" secure="true"
clientAuth="false" sslProtocol="TLS"
keystoreFile="c:\mykeystore" keystoreType="JKS"
keystorePass="myprivatekeypassword" />
```

3. Modify the web.xml files in the following two locations:
   - **<HPBSM root directory>\EJBContainer\server\mercury\deploy\jmx-console.war\WEB-INF\web.xml**
   - **<HPBSM root directory>\EJBContainer\server\mercury\deploy\jboss-web.deployer\ROOT.war\WEB-INF\web.xml**

   Add the **<user-data-constraint>** element as shown below immediately before the **</security-constraint>** element.

```
<user-data-constraint>
<transport-guarantee>CONFIDENTIAL</transport-guarantee>
</user-data-constraint>

</security-constraint>
```

4. Restart the BSM server.

Configuring the JMX Console to Work with SSL in Other Processes

This task describes how to configure the JMX console to work with SSL in other BSM processes.

To configure the JMX console to work with SSL in other BSM processes:

1. Open the following files:
   - <HPBSM root directory>\conf\spring\jmx-html-adaptor-spring.xml
   - <HPBSM root directory>\conf\supervisor\spring\jmx-html-adaptor-spring.xml

and locate the following section in each:

```
<bean id="jmx.html.adaptor" class="com.mercury.infra.utils.jmx.MX4JHtmlAdaptor"
       lazy-init="true">
<property name="sslEnabled"><value>false</value></property>
<property name="keyManagerAlgorithm"><value>SunX509</value></property>
<property name="keyStorePassword"><value>changeit</value></property>
<property name="keyManagerPassword"><value>changeit</value></property>
<property name="keyStoreType"><value>JKS</value></property>
<property name="sslProtocol"><value>TLS</value></property>
<property name="keyStoreName"><value>file.keystore</value></property>
</bean>
```

2. Update the relevant parameters, as indicated in the following table:

Parameter Name	Required Value
sslEnabled	true
keyStorePassword	The password you use to protect the keystore. This is the value of the keystore's **-storepass** parameter, if you created the keystore yourself.
keyManagerPassword	The password you use to protect the private key. This is the value of the keystore's **-keypass** parameter, if you created the keystore yourself.
keyStoreName	The name and path of the file where the keystore is located.

If you do not have a keystore available, you can create one. For details, see "Creating a Keystore" on page 51.

Securing JMX-RMI Channel Used for Internal BSM Communications

To secure the JMX-RMI channel used for internal BSM communications, you must configure JMX-RMI with basic authentication over SSL. This involves the following steps:

- Configuring user name/password authentication
- Configuring SSL for the JMX-RMI channel

Note:

- This procedure was written for Windows. Linux users should use Unix paths and commands as needed.
- If you are securing a JMX channel and using System Health, you must use the Encryption tool provided in the System Health installation to supply JMX monitor credentials to System Health. For details, see the HP System Health Guide.
- This procedure must be performed on every Gateway and Data Processing server in the BSM deployment.

Configuring user name/password authentication

1. Add user role.

   Add the user role to:
   <HPBSM root directory>\JRE64\lib\management\jmxremote.access.

   Example:

   ```
   adminUser readwrite \
          create javax.management.monitor.*,javax.management.timer.* \
          unregister
   ```

2. Create password file.

   a. Copy:
   <HPBSM root directory>\JRE64\lib\management\jmxremote.password.template
   to:
   jmxremote.password

   b. Add the user role defined previously in jmxremote.access to the end of the jmxremote.password file, and set a clear text password. Remember this password so you can test it with the JMX console.

   Example:

   ```
   adminUser mypassword
   ```

3. Protect the password file.

   In Windows:

   a. Change the owner of the **jmxremote.password** file to be an administrator user or the SYSTEM user.

   If you change the owner to the SYSTEM user, you will not be able to view data on the BSM Status page.

   If you change the owner to an administrator user, you will need to change the default log on credentials to run the HP Business Service Management service. This procedure is performed in your operating system. In Windows Server 2008, the procedure is as follows:

   i. Run **services.msc**.

   ii. Right click **HP Business Service Management**.

   iii. In the **Log on** tab, select **This account** and enter the administrator credentials.

   Whatever user you select, you must use the same user for any other similar steps in this procedure.

   To change the owner of the files:

   i. Navigate to **Properties > Security > Advanced > Owner**.

   ii. Click Other Users or Groups, type "**<domain\admin user name>**" or "**SYSTEM**",

and click **Check Names**.

iii. Verify that you see that the value of Current Owner is updated.

b. Change the permissions of jmxremote.password file to be **Full Control** for the owner defined above as follows:

- For administrator user: **cmd: cacls jmxremote.password /P <domain\user name>:F**
- For SYSTEM user: **cmd: cacls jmxremote.password /P SYSTEM:F**

In Linux:

Run the following command: **chmod 600 jmxremote.password**

4. Repeat the above steps for the **<HPBSM root directory>\JRE** directory.
5. Enable authentication on all BSM processes other than JBoss.

   Open **<HPBSM root directory>\bin\service_manager.bat** (in Linux, **service_manager.sh**) and set the authentication to **true**, as in the following example:

   -Dcom.sun.management.jmxremote.authenticate=true
6. Enable authentication on JBoss process.

   Open **<HPBSM root directory>\EJBContainer\bin\mercury_run.bat** (in Linux, **mercury_run.sh**) and set the authentication to **true**, as in the following example:

   -Dcom.sun.management.jmxremote.authenticate=true
7. Enable authentication on nannyManager.

   Open **<HPBSM root directory>\conf\supervisor\manager\nannyManager.wrapper** and set the following:

   wrapper.java.additional.3=-Dcom.sun.management.jmxremote.authenticate=true

Configuring SSL for the JMX-RMI channel

Note: When creating a Java keystore password, make sure your private key password and the keystore password are the same.

1. Create Java keystore (JKS file). For details, see "Creating a Keystore" on page 51.
2. Create a JMX-RMI properties file with SSL parameters.

   Create **jmx-rmi.properties file in <HPBSM root directory>\conf** containing the following lines:

   ```
   com.sun.management.jmxremote.ssl=true
   javax.net.ssl.keyStore=<path to keystore file name with forward slashes>
   javax.net.ssl.keyStorePassword=<keystore password>
   ```

   Note:

   Use forward slashes only, not backslashes.

   Example:

   ```
   com.sun.management.jmxremote.ssl=true
   javax.net.ssl.keyStore=c:/certificate.jks
   javax.net.ssl.keyStorePassword=changeit
   ```

3. Protect the SSL parameters file.

   In Windows:

   a. Navigate to **Properties > Security > Advanced** and change the owner of the **jmx-rmi.properties** file to be an administrator user or the SYSTEM user.

      If you change the owner to the SYSTEM user, you will not be able to view data on the BSM Status page.

      If you change the owner to an administrator user, you will need to change the default log on credentials to run the HP Business Service Management service. This procedure is performed in your operating system. In Windows Server 2008, the procedure is as follows:

      i. Run **services.msc**.

      ii. Right click **HP Business Service Management**.

      iii. In the **Log on** tab, select **This account** and enter the administrator credentials.

      Whatever user you select, you must use the same user for any other similar steps in this procedure.

      To change the owner of the files:

      i. Navigate to **Properties > Security > Advanced > Owner**.

      ii. Click Other Users or Groups, type "**<domain\admin user name>**" or "**SYSTEM**",

and click **Check Names**.

iii. Verify that you see that the value of Current Owner is updated.

b. Change the permissions of **jmx-rmi.properties** file to be **Full Control** for the file owner defined above as follows:

- For administrator user: **cmd: cacls jmx-rmi.properties /P <domain\user name>:F**
- For SYSTEM user: **cmd: cacls jmx-rmi.properties /P SYSTEM:F**

In Linux:

chmod 600 jmx-rmi.properties

4. Enable SSL on JMX-RMI for all BSM processes other than JBoss.

   Open **<HPBSM root directory>\bin\service_manager.bat** (in Linux, service_manager.sh) and make the following changes:

   a. Set the value of `-Dcom.sun.management.jmxremote.ssl=true` to **true**

   b. Add the following string immediately after the string you just modified:

   ```
   -Dcom.sun.management.jmxremote.ssl.config.file=<HPBSM root
   directory>/conf/ jmx-rmi.properties
   ```

5. Enable SSL on JMX-RMI for JBoss process.

   Open **<HPBSM root directory>\EJBContainer\bin\mercury_run.bat** (in Linux, **mercury_run.sh**) and make the following changes:

   a. Set the value of `-Dcom.sun.management.jmxremote.ssl=true`

   b. Add the following string immediately after the string you just modified:

   ```
   -Dcom.sun.management.jmxremote.ssl.config.file=<HPBSM root
   directory>/conf/ jmx-rmi.properties
   ```

6. Enable SSL on JMX-RMI for Nanny process.

   Open **<HPBSM root directory>\conf\supervisor\manager\nannyManager.wrapper** and set the following:

   a. Comment out the line with ssl:

   ```
   #wrapper.java.additional.4=-Dcom.sun.management.jmxremote.ssl=false
   ```

   b. Add this line instead:

   ```
   wrapper.java.additional.4=-Dcom.sun.management.jmxremote.ssl.config.file=<HPBSM root d
   irectory>/conf/jmx-rmi.properties
   ```

7. Make JVM trust the key defined in the keystore file.

   a. Export the public key from the keystore file (use regular keytool).

   Example:

   ```
   keytool -export -alias ca -keystore c:\certificate.jks -rfc -file ca_root.cer
   ```

   where **certificate.jks** is the keystore file, and **ca_root.cer** is the exported public key file.

b. Import the public key into **<HPBSM root directory>\JRE\lib\security\cacerts and <HPBSM root directory>\JRE64\lib\security\cacerts**.

Example:

```
<HPBSM installation directory>\JRE64\bin\keytool -import -alias ca -file ca_root.
cer -keystore <HPBSM installation directory>\JRE64\lib\security\cacerts

<HPBSM installation directory>\JRE\bin\keytool -import -alias ca -file ca_root.ce
r -keystore <HPBSM installation directory>\JRE\lib\security\cacerts
```

where **ca_root.cer** is the public key file, and **cacerts** is the default truststore used by JVM.

c. Enable the BSM Server. If the BSM server cannot be enabled, see **<HPBSM installation directory>\log\supervisor\wrapper.log**.

Chapter 5

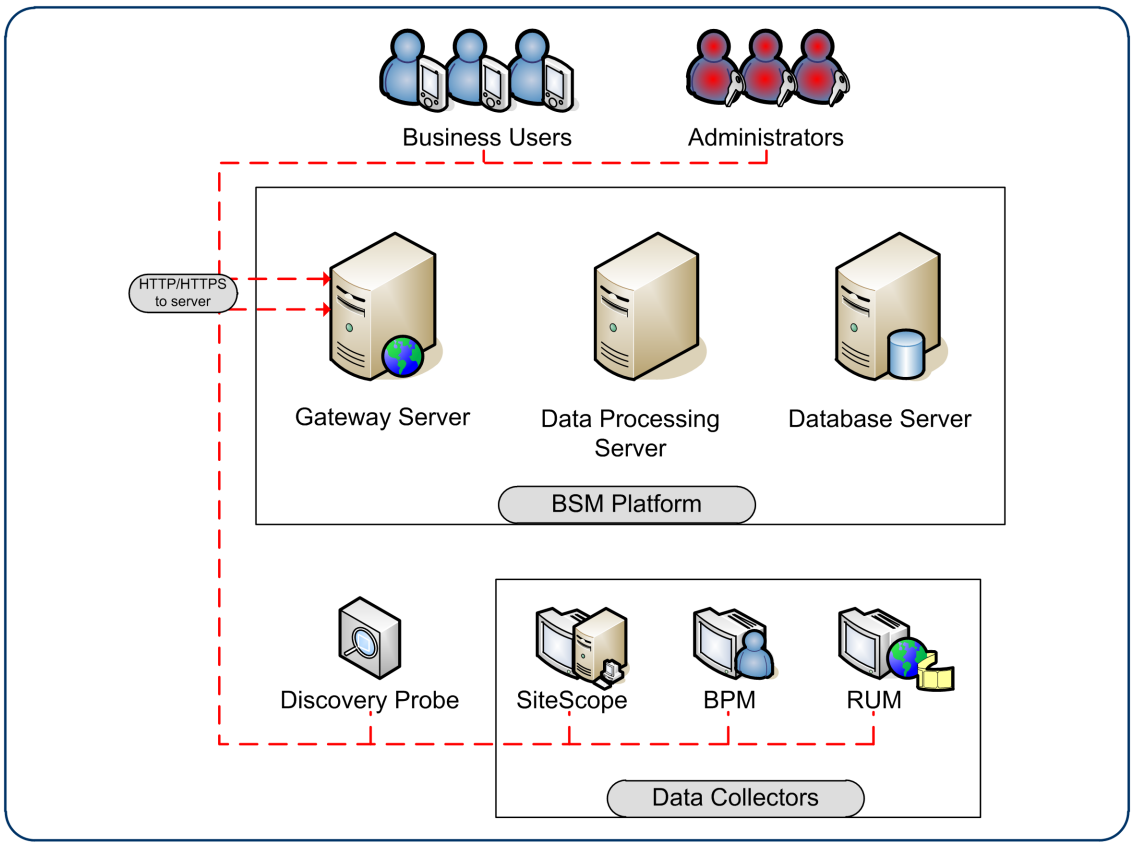
Using Basic Authentication in BSM

The BSM platform fully supports the basic authentication schema, which provides BSM with the ability to authenticate a client communicating with a BSM server via HTTP or HTTPS.

The basic authentication schema is based on the client sending its credentials to the server so that the server can authenticate the client. The client's credentials are sent in a Base64 encoding format and are not encrypted in any way. If you are concerned that your network traffic may be monitored by a sniffer, it is recommended that you use basic authentication in conjunction with SSL. This sends the client's credentials over an encrypted wire (after the SSL handshake has been completed).

For information on configuring the BSM platform to support SSL communication, see "Using SSL in BSM" on page 39.

Possible basic authentication channels in BSM are illustrated in the following diagram:



Note: The BSM components do not support basic authentication with blank passwords. Do not use a blank password when setting basic authentication connection parameters

Overview of Configuring Basic Authentication in BSM

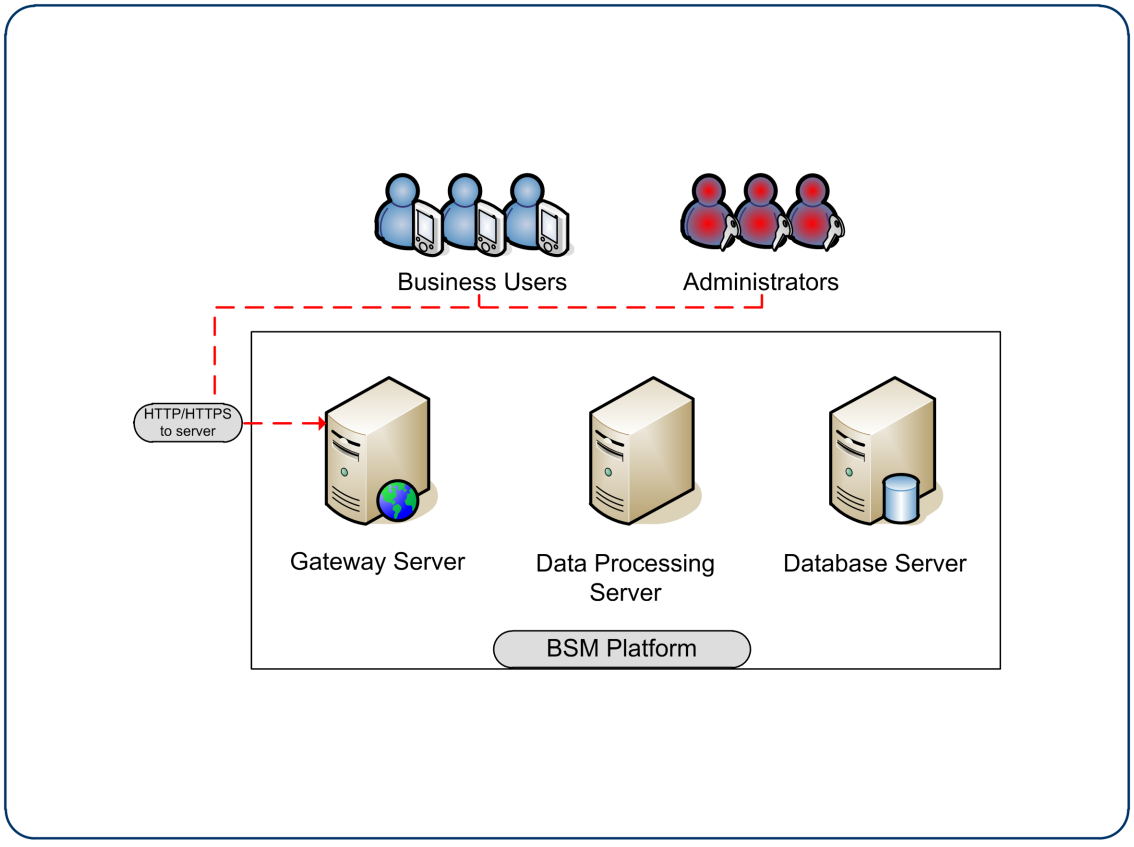
Before proceeding with the configuration steps, ensure that:

- The BSM platform is operating as it is supposed to without basic authentication.
- You read this chapter in its entirety before you begin performing the configuration.
- You define your authentication requirements and use basic authentication only where required.

Note: The configuration specified for each BSM server is also relevant for a single machine installation, in which the Gateway Server and Data Processing Server both reside on the same machine.

Configuring Basic Authentication Between the Gateway Server and Application Users

The instructions in this section describe how to configure the Gateway Server (or a BSM machine, in the case of a single machine installation) and its clients, and application users to support basic authentication.



Basic Authentication Configuration for the Gateway Server

This section provides instructions for configuring the Gateway Server (or a BSM machine, in the case of a single machine installation) to support basic authentication.

Caution: Some JREs request an additional username and password confirmation when accessing applets imbedded in BSM, such as the Service Health Topology Map, System Health, and IT Universe Manager.

Enable Basic Authentication Support on the Web Server

The first step in configuring the Gateway Server to support basic authentication is to configure the Web server used by the Gateway Server.

Note: On each Web server, make sure that you enable basic authentication only and disable anonymous access. Once you have enabled basic authentication, validate the settings by requesting a BSM resource and ensuring that you are prompted to insert basic authentication parameters.

- **Microsoft Internet Information Server (IIS) 5.0 and 6.0.** See http://support.microsoft.com/kb/324276/en-us for information on enabling basic authentication for all interaction with the Web server. Note that basic authentication should be enabled for the entire IIS Web Site under which you installed the BSM applications.
- **Apache HTTP Server 2.2.x**. See the http://httpd.apache.org/docs-2.0/howto/auth.html for information on enabling basic authentication for all interaction with the Web server, using **mod_auth**. Note that basic authentication should be enabled on all the directories used by the Web server.

Basic authentication can only be added in conjunction with enabling SSL on the web server.

Once you have performed the above configuration procedures, when you are using a Microsoft IIS 5.0 or 6.0 Web server, you must make sure that all the folders and files in use by BSM have the required NTFS permissions required for the users connecting to BSM.

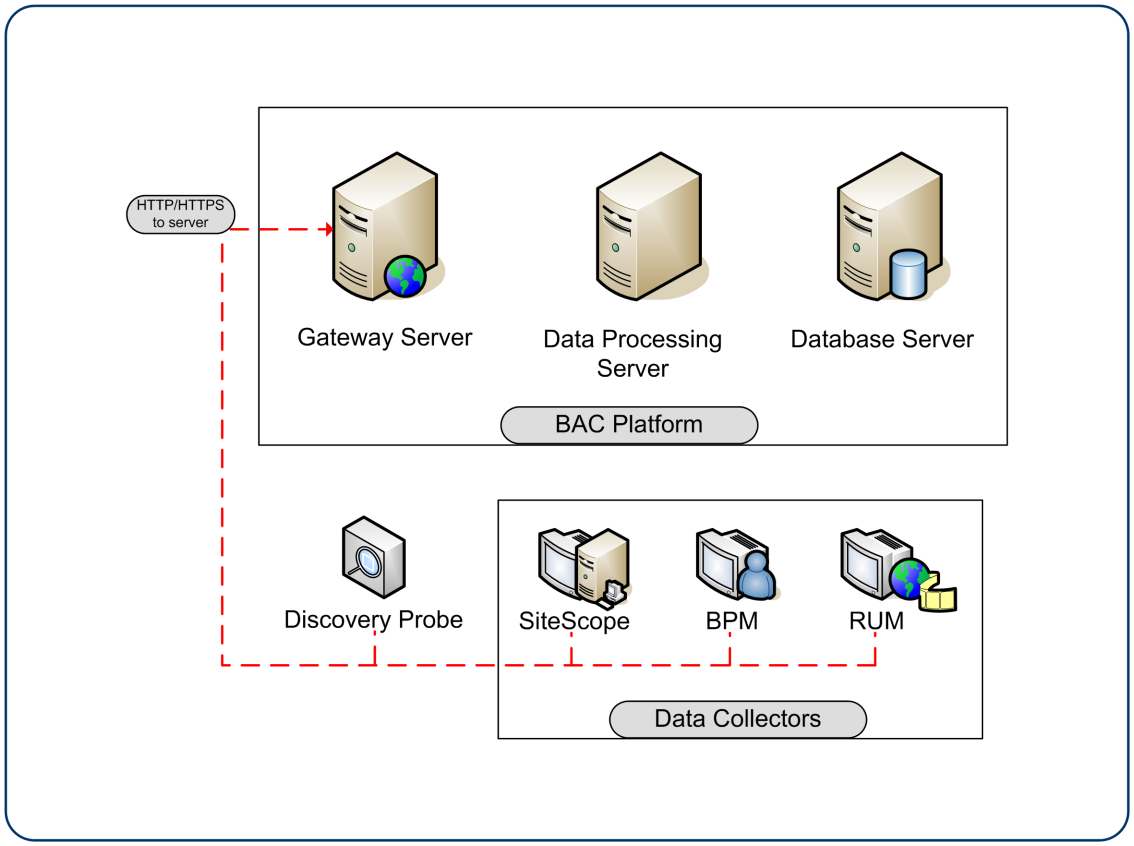
Basic Authentication Configuration for the Application Users

This section provides instructions for configuring the application users (Gateway Server clients) to support basic authentication.

To connect as an application user to a BSM server that requires basic authentication, it is only necessary for you to know the credentials of the user permitted to log in to the BSM Web server. When connecting to the Web server, you will be prompted to enter these credentials. The authentication is then performed automatically.

Configuring Basic Authentication Between the Gateway Server and the Data Collectors

The instructions in this section describe how to configure the Gateway Server and the BSM data collectors to support basic authentication. To enable basic authentication support, you must make the required changes for the Gateway Server, as well as for all the BSM data collectors connecting to it using HTTP/S.



Basic Authentication Configuration for the Gateway Server

This section provides instructions for configuring the Gateway Server (or a BSM machine, in the case of a single machine installation) to support basic authentication.

Enable Basic Authentication Support on the Web Server

The first step in configuring the Gateway Server to support basic authentication is to configure the Web server used by the Gateway Server.

Note: On each Web server, make sure that you enable basic authentication only and disable anonymous access. Once you have enabled basic authentication, validate the settings by requesting a BSM resource and ensuring that you are prompted to insert basic authentication parameters.

- **Microsoft Internet Information Server (IIS) 5.0 and 6.0**. See http://support.microsoft.com/kb/324276/en-us for information on enabling basic authentication for all interaction with the Web server. Note that basic authentication should be enabled for the entire IIS Web Site under which you installed the BSM applications.
- **Apache HTTP Server 2.2.x**. See the http://httpd.apache.org/docs-2.2/howto/auth.html for information on enabling basic authentication for all interaction with the Web server, using mod_auth. Note that basic authentication should be enabled on all the directories used by the Web server.

Once you have performed the above configuration procedures, when you are using a Microsoft IIS 5.0 or 6.0 Web server, you must make sure that all of the folders and files in use by BSM has the required NTFS permissions required for the users connecting to BSM.

After performing the above procedures, the Web server installed on the Gateway Server is configured to support basic authentication for HTTP/S communication.

Basic Authentication Configuration for the Data Collectors

This section provides instructions for configuring the following BSM data collectors to support basic authentication.

Note: The Staging Data Replicator (used during a staging upgrade) does not support basic authentication.

Business Process Monitor

If you configured the Gateway Server to require basic authentication, you must configure the Business Process Monitor to connect to the Gateway Server using basic authentication.

To configure the Business Process Monitor to use basic authentication:

1. Open the Business Process Monitor Admin (**http://<Business Process Monitor machine>:2696**).
2. In the Business Process Monitor page, identify the Business Process Monitor instance you want to configure from the **Instances** list and click the Edit button for the instance. The Edit Instance page opens.
3. In the **Authentication** section, enter the following parameter values:
   - **Authentication user name**. The user name to be used to log in to the Gateway Server.
   - **Authentication user password**. The user password to be used to log in to the Gateway Server.
   - **Authentication domain**. The domain name to be used to log in to the Gateway Server.
4. Click **Save Changes and Restart Instance**.

SiteScope

If you configured the Gateway Server to require basic authentication, you must configure the SiteScope machine to connect to the Gateway Server using basic authentication.

To configure the SiteScope machine to use basic authentication:

1. If you are configuring SiteScope using System Availability Management Administration, right-click the SiteScope you want to instruct to use basic authentication, and select **Edit**.
   a. In the Profile Settings section of the Edit SiteScope page, enter the following parameter values:
      - **Web server authentication user name**. The user name and domain of the Gateway Server (in the format domain\user name).
      - **Web server authentication password**. The password of the Gateway Server.
   b. Click OK at the bottom of the page and restart the SiteScope instance.

2. If you are configuring SiteScope using the SiteScope interface, select **Preferences > Integration Preferences**.
   a. In the Optional Settings section of the BSM Server Registration page, enter the following parameter values:
      - **Authentication username**. The user name and domain of the Gateway Server (in the format domain\user name).
      - **Authentication password**. The password of the Gateway Server.
   b. Click the Update button at the bottom of the page and restart the SiteScope instance.

BSM Connector

If you configured the Gateway Server to require basic authentication, you must configure the BSM Connector machine to connect to the Gateway Server using basic authentication.

To configure the BSM Connector machine to use basic authentication:

1. Go to **Admin > Integrations > BSM Connector Integrations**
2. Right-click the BSM Connector you want to instruct to use basic authentication, and select Edit.
   a. In the **Profile Settings** section of the Edit BSM Connector page, enter the following parameter values:
      - **Web server authentication user name**. The user name and domain of the Gateway Server (in the format domain\user name).
      - **Web server authentication password**. The password of the Gateway Server.
   b. Click **OK** at the bottom of the page and restart the BSM Connector instance.

Real User Monitor

If you configured the Gateway Server to require basic authentication, you must configure the Real User Monitor engine machine to connect to the Gateway Server using basic authentication.

To configure the Real User Monitor engine machine to use basic authentication:

1. Open the Real User Monitor Web Console (**http://<Real User Monitor engine name>:8180/rumconsole**).
2. Click the **Configuration** tab.
3. Under **Basic Authentication**, select the **Use basic authentication** check box and enter the following parameter values:
   - **Authentication user name**. The user name to be used to log in to the Gateway Server.
   - **Authentication user password**. The user password to be used to log in to the Gateway Server.
   - **Authentication domain**. The domain name to be used to log in to the Gateway Server.
4. Click **Save Configuration**.

Chapter 6

Troubleshooting and Limitations

Login Problems

Issue	Resolution
Login page does not load when using SSL	Check that server certificate was generated correctly. All fields must be filled in properly, including email, city, state, etc. For example, in IIS6, go to **Default WebSite > Directory Security > Certificates > View > Details**. Subject should be filled in completely. Enhanced Key Usage must be "Server Authentication".
Cannot log in through Reverse Proxy; login page not fully displayed	Try to log in directly to BSM Gateway, bypassing the proxy. Make sure that the port (even if it is default port) is specified in Platform Administration infrastructure settings (**Default Virtual Gateway Server for Application Users URL**) for the virtual URLs. If you change virtual server URLs, restart BSM.
Cannot log in through Reverse Proxy	A firewall in the environment may be blocking BSM server from resolving Reverse Proxy IP address. **Solution:** Remove Reverse Proxy IP address from the settings, restart BSM servers, and try again.
Cannot log in; blank page or error in login.jsp - permission denied	• This is typically a result of inconsistency in Host Configuration infrastructure settings. **Solution:** Try to log in directly to the BSM Gateway (bypassing Reverse Proxy) and verify that the virtual host URL for application server is correct. Copy/paste it into the browser and check that the page will load. • The virtual URLs may reference the reverse proxy, or vice versa, when reverse proxy is not used. **Solution:** Fix the settings, restart BSM server, and try again. To restore to clean, set these to empty string using JMX console (context = platform): ▪ default.centers.server.url = empty or original (with port) ▪ default.core.server.url ▪ Enable.reverse.proxy = false ▪ Http.reverse.proxy.ip = empty

Issue	Resolution
Internal error when trying to load BSM url; FileNotFound error in topaz_ all.ejb.log for lwssofmconf.xml	Most likely, the path to the keystore is incorrect after upgrade or new lines were introduced into the setting when manually updated. **Solution:** 1. Fix configuration: http://<BSM_SERVER>:<JBOSS_PORT>/jmx-console/ (Domain: Foundations, Service: Infrastructure Settings Manager) To retrieve configuration in a string format, use **getGlobalSettingValue()** with: contextName=**SingleSignOn** settingName=**lw.sso.configuration.xml**. Make sure that the new configuration is stored in a single-lined string! No newlines are expected. You can use any text editor to change the configuration as desired. To store configuration, use **setGlobalSettingValue()** with contextName=**SingleSignOn** settingName=**lw.sso.configuration.xml** newValue=**<NEW_VALUE_STRING>** 2. Reload configuration: go to service = **SSO** invoke **Start()**