

Blue Coat® Systems

Reference Guide

SSL Proxy

For SGOS 5.3.1



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# Introduction to the Blue Coat SSL Proxy

HTTPS traffic is the same as HTTP traffic except that it is encapsulated so that the content is hidden.

HTTPS traffic poses a major security risk to enterprises. Because SSL (Secure Socket Layer) content is encrypted, it can't be intercepted by normal means. Users can bring in viruses, access forbidden sites, and leak business confidential information over an HTTPS connection, which uses port 443.

Because IT organizations have no visibility into SSL sessions, they are blind to any potential security threats sent over HTTPS.

In addition to the security threat, encrypted traffic makes it difficult for IT to assess bandwidth usage and apply intelligent content control policies to ensure maximum user productivity.

Prior to the SSL Proxy, the only solution for managing HTTPS traffic was to deny HTTPS altogether or severely limit its usage.

## What the SSL Proxy Does

The SSL Proxy can be used to tunnel or intercept HTTPS traffic. The SSL Proxy tunnels all HTTPS traffic by default unless there is an exception, such as a certificate error or a policy denial. In such cases the SSL Proxy intercepts the SSL connection and sends an error page to the user. The SSL Proxy allows interception of HTTPS traffic even when there are no errors. Such interception enables the application of various security policies to HTTPS content.

Some HTTPS traffic, such as financial information, should not be intercepted, but instead passed through in a dedicated tunnel. The following table lists the available functions depending on whether the SSL proxy is used to tunnel or intercept HTTPS traffic:

**Table 1-1.**

SSL Proxy Function	Tunneling	Interception
Validate server certificates, including revocation checks using Certificate Revocation Lists (CRLs) and Online Certificate Status Protocol (OCSP).	✓	✓
Check various SSL parameters such as cipher and version.	✓	✓
Log useful information about the HTTPS connection.	✓	✓

**Table 1-1.**

SSL Proxy Function	Tunneling	Interception
Cache HTTPS content.		✓
Apply HTTP-based authentication mechanism.		✓
Scan for viruses and filter specified URLs.		✓
Apply granular policy (such as validating MIME type and filename extension).		✓

The Blue Coat SSL proxy allows you to:

- ❑ Determine what HTTPS traffic to intercept through existing policy conditions, such as destination IP address and port number. You can also use the hostname in the server certificate to make the intercept versus tunnel decision.
- ❑ Validate the server certificate to confirm the identity of the server, and check Certificate Revocation Lists (CRLs) to be sure the server certificate has not been revoked.
- ❑ Apply caching, virus scanning and URL filtering policies to intercepted HTTPS traffic.

## Increasing Control

The SSL proxy allows you to increase control by:

- ❑ Distinguishing between SSL and non-SSL traffic on the same port.
- ❑ Distinguishing HTTPS from other protocols over SSL.
- ❑ Categorizing sites by their SSL server certificate hostname.
- ❑ Enhancing security through:
  - Server certificate validation, including revocation checks with the help of CRLs and OCSP.
  - Virus scanning and URL filtering of HTTPS content.

The SSL proxy also improves visibility into SSL traffic by creating log files, and enhances performance by caching data.

# SSL Proxy Overview

SSL and tunneling protocols are closely tied together. To understand SSL, you must first understand how tunneling applications work.

This chapter discusses:

- ❑ “Understanding SSL” on page 7
- ❑ “Using an SSL Proxy for Privacy, Authentication, and Data Integrity” on page 8
- ❑ “SSL Proxy Versus HTTPS Reverse Proxy” on page 9

## Understanding SSL

At the lowest level, SSL is layered on top of TCP/IP. SSL uses the SSL Handshake Protocol to allow the server and client to authenticate each other and to negotiate the encryption cipher before the application protocol transmits or receives its first byte of data.

SSL has emerged as the de facto standard protocol for establishing a secure, encrypted link between a remote application server and the client Web browser on the local user’s desktop.

SSL is a proven technology with strong appeal to IT organizations because each secure session link is automatically established “on demand” using standards-based protocols, encryption techniques, and certificate exchange – all without the need for any IT administration.

The process of setting up the private connection is automatically initiated by the server communicating directly with the browser. The result is a private, encrypted tunnel used to move information between the server and client desktop. When the session is over, the connection is automatically terminated.

However, SSL sessions are rapidly becoming a conduit for a variety of enterprise security threats – including spyware, viruses, worms, phishing, and other malware.

## Using an SSL Proxy for Privacy, Authentication, and Data Integrity

The SSL proxy can manage the SSL sessions in such a way as to prevent enterprise security threats while at the same time allowing you to determine the level of control.

If the HTTPS traffic contains financial information, you probably do not want to intercept that traffic.

However, many other kinds of traffic can and should be intercepted by the SSL proxy.

### Determining What HTTPS Traffic to Intercept

The default mode of operation for the SSL Proxy is to intercept HTTPS traffic only if there is an exception, such as a certificate error. Otherwise, it tunnels all HTTPS traffic.

To intercept HTTPS traffic for reasons other than error reporting, many existing policy conditions, such as destination IP address and port number, can be used.

Additionally, the SSL proxy can use the hostname in the server certificate to make the decision to intercept or tunnel the traffic. The server certificate hostname can be used as-is to make intercept decisions for individual sites, or it can be categorized using any of the various URL databases supported by Blue Coat. Categorization of server certificate hostnames can help place the intercept decision for various sites into a single policy rule.

Recommendations for intercepting traffic include:

- ❑ Intercept Intranet traffic.
- ❑ Intercept suspicious Internet sites, particularly those that are categorized as **none** in the server certificate.
- ❑ Intercept sites that provide secure web based e-mail, such as Gmail over HTTPS.

### Managing Decrypted Traffic

After the HTTPS connection is intercepted, you can do:

- ❑ Anti-virus scanning over ICAP.
- ❑ URL filtering (on-box and off-box). Blue Coat recommends on-box URL/Content filtering if you use transparent proxy. When the URL is sent off-box for filtering, only the hostname or IP address of the URL (not the full path) is sent for security reasons.
- ❑ Filtering based on the server certificate hostname.
- ❑ Caching.



HTTPS applications that require browsers to present client certificates to secure Web servers do not work if you are intercepting traffic. Such applications should not be intercepted by creating a policy rule.

If you intercept HTTPS traffic, be aware that local privacy laws might require you to notify the user about interception or obtain consent prior to interception. You can use the HTML Notify User object to notify users after interception. You can use consent certificates to obtain consent prior to interception. The HTML Notify User is easier; however, note that the ProxySG has to decrypt the first request from the user before it can issue an HTML notification page.

## Digital Certificates and Certificate Authorities

Server certificates are used to authenticate the identity of a server. A certificate is an electronic confirmation that the owner of a public key is who he or she really claims to be, and thus holds the private key corresponding to the public key in the certificate. The certificate contains other information, such as its expiration date.

The association between a public key and a particular server is done by generating a certificate signing request using the server's public key. A Certificate Authority (CA) verifies the identity of the server and generates a signed certificate. The resulting certificate can then be offered by the server to clients who can recognize the CA's signature and trust that the server is who it claims to be. Such use of certificates issued by CAs have become the primary infrastructure for authentication of communications over the Internet.

ProxySG appliances come with many popular CA certificates already installed. You can review these certificates using the Management Console or the CLI. You can also add certificates for your own internal certificate authorities.

ProxySG appliances trust all root CA certificates trusted by Internet Explorer and Firefox. The list is updated periodically to be in sync with the latest versions of IE and Firefox.

CA certificates installed on the ProxySG are used to verify the certificates presented by HTTPS servers and the client certificates presented by browsers (when browsers are configured to do so).

ProxySG appliances also check Certificate Revocation Lists (CRLs, which are provided and maintained by CAs) for certificates that have been revoked.

## SSL Proxy Versus HTTPS Reverse Proxy

Depending on your needs, you can use the ProxySG as either an SSL proxy or an HTTPS reverse proxy. SSL proxy functionality enables the ProxySG to act as forward proxy for HTTPS requests.

- An SSL proxy is a client-side proxy typically used for applying security and performance features such as authentication, URL filtering, and caching.

**This deployment guide discusses the HTTPS forward proxy. To configure the ProxySG as an HTTPS reverse proxy, refer to the *Blue Coat ProxySG Configuration and Management Guide documentation suite*.**

- An HTTPS reverse proxy is a server-side proxy typically used to offload SSL processing from server to the proxy. Reverse proxies are deployed in proximity to the server. The communication between the HTTPS reverse proxy and server might or might not use SSL. The ProxySG can be used as an HTTPS reverse proxy with the help of the existing HTTPS Reverse Proxy service. Performance is usually the only objective.

## Best Practices and Deployment

This chapter contains answers to frequently-asked SSL Proxy deployment questions.

### **Question: What do I need to know before deploying the SSL Proxy?**

**Answer:** With SGOS 4.2.2 and higher, the default mode of operation for the SSL proxy is “intercept on exception, tunnel otherwise.” Common examples of exceptions for which the SSL Proxy intercepts traffic in this default mode are certificate errors and policy based denials. To intercept HTTPS traffic for purposes other than error reporting (such as antivirus scanning or caching), you must create additional policy.

The SSL proxy can detect the following certificate errors for both intercepted and tunneled traffic:

- ☐ The certificate has expired (or is valid at a future date).
- ☐ The certificate issuer is untrusted; that is, the ProxySG does not recognize or trust the issuer of the certificate.
- ☐ The certificate has been revoked. The ProxySG does a revocation check using Certificate Revocation Lists (CRLs) to determine if the issuer of the certificate has revoked the certificate.

**Recommendation:** Audit all internal HTTPS servers to verify that they use valid certificates before upgrading the ProxySG to SGOS 5.x. This ensures that internal HTTPS sites accessed through the ProxySG do not break after enabling the SSL Proxy.

**Answer:** After the SSL proxy starts intercepting traffic, it also verifies that the common-name (CN) in the certificate matches with the request URL, and denies data exchange between client and server when a mismatch is detected.

**Answer:** In the case of server certificate errors, the SSL proxy intercepts the connection in default mode and sends an exception page to the browser showing the cause of the error. In addition, from the SSL access logs, you can monitor the following fields to learn which servers present certificates with errors and what the ProxySG is doing:

- ❑ `x-rs-certificate-observed-errors`: Shows all the actual error(s) detected with the certificate except `hostname-mismatch` error. Detected errors include `untrusted-issuer`, `expired`, and `revoked`.
- ❑ `x-rs-certificate-validate-status`: Shows the certificate validation status after following policy rules. If policy ignores a specific certificate validation error, this field shows the status as `CERT_VALID`, although the certificate presented by a server has the error.

**Recommendation:** Leave the SSL proxy in its default mode where it intercepts the connection in case of errors and reports an exception to the browser. If no errors are found, traffic is tunneled. This allows you to better understand the SSL traffic in your network and helps you write suitable interception policy.

### Question: How do I fix server certificate errors?

**Answer:** The following certificate errors can be detected by SSL Proxy:

- ❑ `untrusted-issuer`
- ❑ `expired`
- ❑ `revoked`
- ❑ `hostname mismatch` (intercepted connections only)

The most secure way to fix any of these errors is to get a new certificate that does not have the detected error. Many times, however, the sites presenting a bad certificate are not in administrative control. In this case, the SSL proxy provides a way to ignore certificate errors for certain sites through policy.

**Recommendation:** If internal HTTPS servers use certificates issued by an internal Certificate Authority (CA), the SSL proxy flags such certificates with the “untrusted-issuer” error. To prevent such errors, import the internal CA certificate to the ProxySG as a trusted certificate. Do not ignore untrusted-issuer errors through policy, because an untrusted-issuer error means that nothing from the certificate can be trusted.

Do not disable certificate validation globally. Assess ignorable certificate errors on a case-by-case basis, as discussed below.

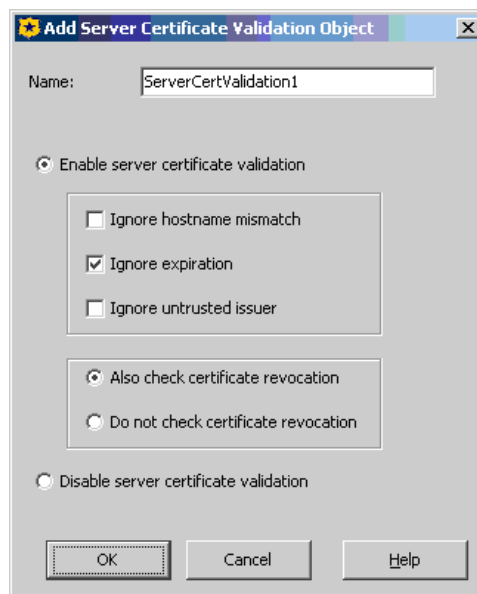
**Procedure:** To ignore certificate errors for specific sites

1. Launch the Visual Policy Manager:
  - a. On the Configuration tab, click Policy>Visual Policy Manager.
  - b. Click the Launch button.
2. Add an SSL Access Layer by selecting Policy>Add SSL Access Layer from the menu bar.

A policy row is added by default when you create a layer.

For detailed information on the Visual Policy Manager, refer to *Volume 6: VPM and Advanced Policy*.

3. Right click the Destination field; select Set to open the Set Destination Object window.
4. Click New, then:
  - a. Add a condition for Destination Host/Port or Server URL.
  - b. Add the IP address and the port or the server URL.
  - c. Click Close.
  - d. Click OK.
5. Right click the Action field; select Set.
6. Click New and select Set Server Certificate Validation.



7. Select the certificate errors to ignore (for example, Ignore expiration), and then click OK.
8. Click OK to close the Set Action Object window.
9. Apply the policy by clicking Install Policy in the upper-right-hand corner.

### Question: How do I selectively intercept SSL traffic?

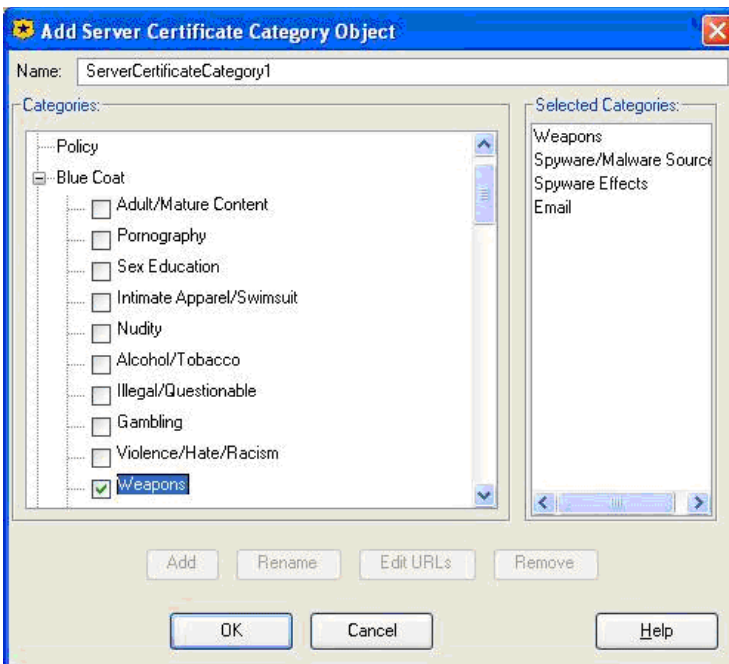
**Answer:** To selectively intercept SSL traffic using the most preferred method, configure a URL filter database.

Using the Blue Coat Web Filter as an example, the following steps show how to create a rule that intercepts selected categories.

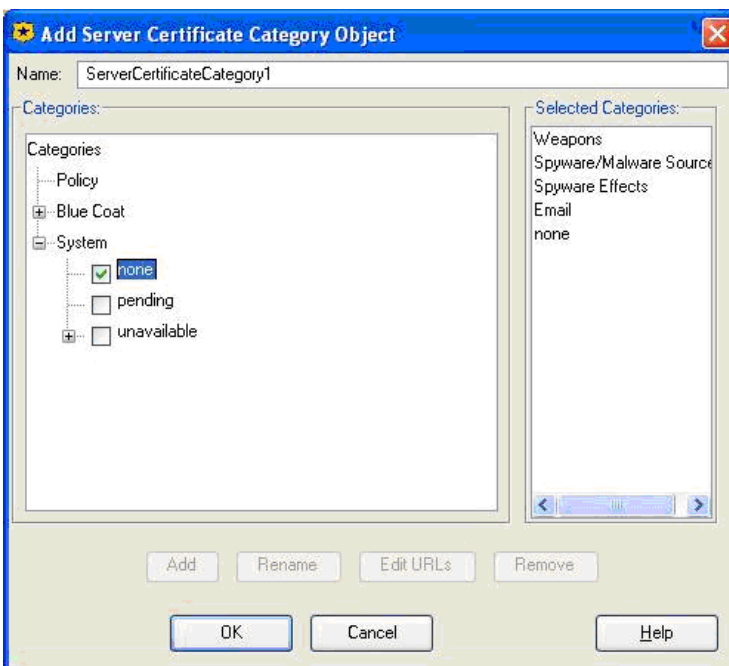
1. Launch the Visual Policy Manager from Configuration>Policy>Visual Policy Manager.
2. Add an SSL Intercept Layer by selecting Policy>Add SSL Intercept Layer from the menu bar.

A policy row is added by default when you create a layer.

3. Right click the Destination field; select Set, then New.
4. Select the Server Certificate Category and expand the Blue Coat category.



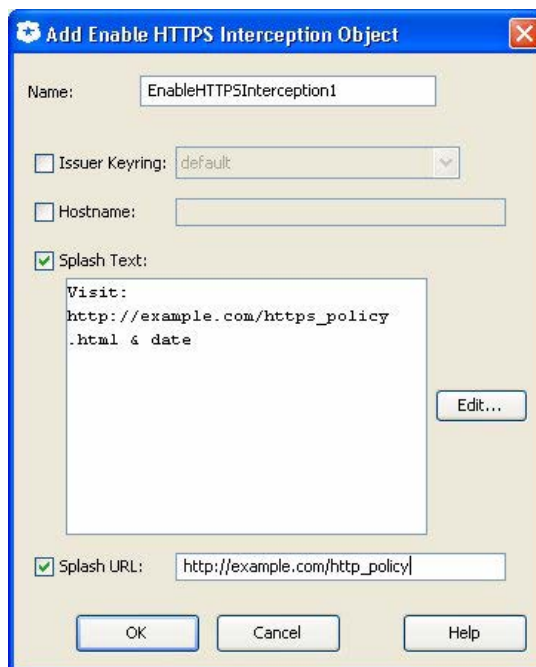
5. Select the categories to intercept. Examples include weapons, Spyware/Malware sources, secure web based e-mail, and the like.



6. Expand the System category; select none to intercept Web sites whose categorization is unknown.

This allows you to treat unrated sites as suspicious and apply security policies to the data transferred to and from such sites.

7. Click OK.
8. Click OK.
9. Right click the Action field; select Set, then New.
10. Select Enable HTTPS Interception



11. To allow SSL content to be examined, select:
  - a. **Issuer Keyring:** Accept the default keyring or select this option and from the drop-down list select a previously generated keyring. This is the keyring used for signing emulated certificates.
  - b. **Hostname:** The hostname you enter here is the hostname in the emulated certificate.
  - c. **Splash Text:** The limit is 200 characters. The splash text is added to the emulated certificate as a certificate extension. The splash text is added to the emulated certificate as a certificate extension. For example:  
  
 Visit http://example.com/https\_policy.html  
  
 To add substitution variables to the splash text, click **Edit** and select from the list.
  - d. **Splash URL:** The splash text is added to the emulated certificate as a certificate extension.

For additional details on the SSL Forward Proxy object, refer to Volume 3 of the *Volume 2: Proxies and Proxy Services*.

Not all browsers display the splash text and splash URL correctly.

Tip: E-mail the console URL corresponding to the issuer certificate to end users so that the end-user can install the issuer certificate as a trusted CA.

The SSL splash can be caused by such occurrences as when a browser receives a server certificate signed by an unknown CA, or a host mismatch.

12. Click **OK**.
13. Click **OK**.
14. Apply the policy by clicking **Install Policy** in the upper-right-hand corner.

### Question: Can the ProxySG Distribute issuer certificates to client desktops?

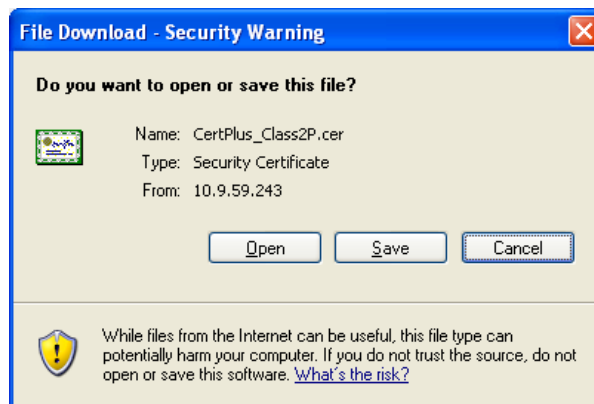
**Answer:** When the SSL Proxy intercepts an SSL connection, it presents an emulated server certificate to the client browser. The client browser issues a security pop-up to the end-user because the browser does not trust the issuer used by the ProxySG. This pop-up does not occur if the issuer certificate used by SSL Proxy is imported as a trusted root in the client browser's certificate store.

The ProxySG makes all configured certificates available for download via its management console. You can ask end users to download the issuer certificate through Internet Explorer or Firefox and install it as a trusted CA in their browser of choice. This eliminates the certificate popup for emulated certificates.

To download the certificate through Internet Explorer, see "To download a certificate through Internet Explorer". To download a certificate through Firefox, see "To download a certificate through Firefox" on page 17.

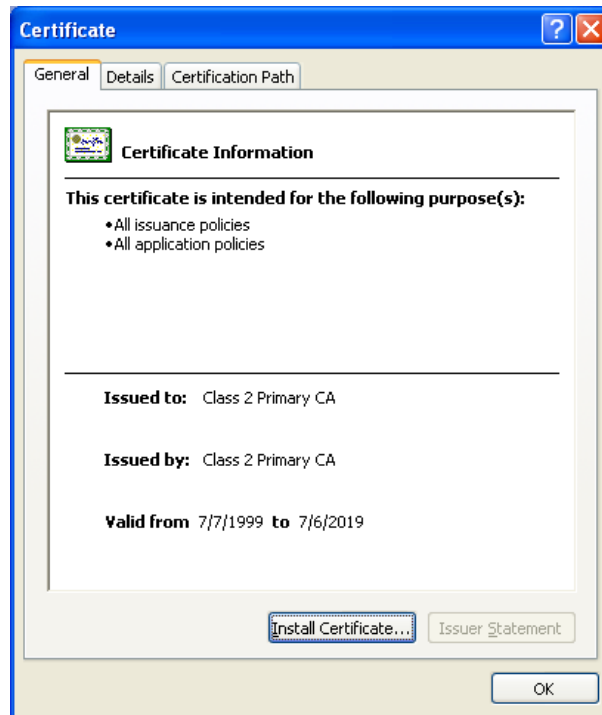
**Procedure:** To download a certificate through Internet Explorer

1. Go to **Statistics>Advanced**.
2. From the **SSL** section, click **Download a ProxySG Certificate as a CA Certificate**; the list of certificates on the system display.
3. Click a certificate (it need not be associated with a keyring); the File Download Security Warning displays asking what you want to do with the file.



4. Click **Save**. When the Save As dialog box displays, click **Save**; the file downloads.
5. Click **Open** to view the Certificate properties; the Certificate window displays.





6. Click the **Install Certificate** button to launch the Certificate Import Wizard.
7. Make sure the **Automatically select the certificate store based on the type of certificate** radio button is enabled before completing the wizard; the wizard announces when the certificate is imported.
8. (Optional) To view the installed certificate, go to Internet Explorer, **Select Tools>Internet Options>Contents>Certificates**, and open either the **Intermediate Certification Authorities** tab or the **Trusted Root Certification Authorities** tab, depending on the certificate you downloaded.

**Procedure:** To download a certificate through Firefox

1. Go to **Statistics>Advanced**.
2. Select **SSL**.
3. Click **Download a ProxySG Certificate as a CA Certificate**; the list of certificates on the system display.
4. Click a certificate (it need not be associated with a keyring); the **Download Certificate** dialog displays.

Tip: E-mail the console URL corresponding to the issuer certificate to end users so that the end-user can install the issuer certificate as a trusted CA.



5. Enable the checkboxes needed. Note that you should view the certificate before trusting it for any purpose.
6. Click OK; close the Advanced Statistics window.

**Question:** In addition to browser warnings, how do I create a web page to explicitly warn users of invalid certificates and allow them the choice to ignore the error and continue to the content?

*Description:* Some servers may have invalid certificates, which trigger warnings from browsers for instances such as self-signed certificates (untrusted issuer), expired certificates, and hostname mismatches with the certificate. Users' connected to these sites through the ProxySG with the SSL proxy enabled can receive an additional error page explaining the reason why users could not access the page.

*Solution:* Present a warning message to users that allows them to connect to the HTTPS site by clicking on a link. This requires two components: policy and modified exception pages.

You must

- ❑ Ensure SSL traffic is in intercept mode:

In VPM, create an SSL Intercept layer policy; intercept only the URLs you want to apply to the Certificate Not Valid policy.

- ❑ Modify the built-in exceptions:

- ssl\_domain\_invalid
- ssl\_server\_cert\_expired
- ssl\_server\_cert\_untrusted\_issuer.

See "Certificate Not Valid Exception" on page 19.

- ❑ Install the Certificate Not Valid Policy.

See "Certificate Not Valid Policy" on page 20.

## Certificate Not Valid Exception

This exception needs to be placed in your local policy.

```
(exception.ssl_domain_invalid
  (contact)
    (details "Your request contacted a host which presented a
      certificate with a Common Name that did not match the domain
      requested.")
    (format <!--eof--
```

Your request contacted a host which presented a certificate  
with a Common Name that did not match the domain requested.

<br>

<br>

<form method="get" action="\$(url)">

<input type="submit" style="width:400;height:24;"

value="Click here if you have a legitimate reason to access  
this site"></form>

<br>

--eof--

)

(help "This is typically caused by a Web Site presenting an  
incorrect or invalid certificate, but could be because of a  
configuration error.")

(summary "SSL Certificate Hostname Mismatch")

(http

(code "409")

(contact)

(details)

(format)

(help)

(summary)

)

)

(exception.ssl\_server\_cert\_expired

(contact)

(details "Your request contacted a host which presented an  
expired or Invalid certificate")

(format <!--eof--

Your request contacted a host which presented an expired or  
Invalid certificate.

<br>

<br>

<form method="get" action="\$(url)">

<input type="submit" style="width:400;height:24;"

value="Click here if you have a legitimate reason to access  
this site"></form>

<br>

--eof--

)

(help "This is typically caused by a Web Site presenting an  
incorrect or invalid certificate, but could be because of a  
configuration error. ")

(summary "Expired SSL Server Certificate")

(http

(code "503")

(contact)

```

(details)
(format)
(help)
(summary)
)
)
(exception.ssl_server_cert_untrusted_issuer
(contact)
(details "Your request contacted a host which presented a
certificate signed by an untrusted issuer.")
(format <--eof--
Your request contacted a host which presented a certificate
signed by an untrusted issuer.
<br>
<br>
<form method="get" action="$(url)">
<input type="submit" style="width:400;height:24;"
value="Click here if you have a legitimate reason to access
this site"></form>
<br>
--eof--
)
(help "This is typically caused by a Web Site presenting an
incorrect or invalid certificate, but could be because of a
configuration error.")
(summary "Untrusted SSL Server Certificate")
(http
(code "503")
(contact)
(details)
(format)
(help)
(summary)
)
)

```

### Certificate Not Valid Policy

```

<exception> condition=sslexception
    action.mycookie(yes)
<proxy>
    condition=sslallow request.header.cookie="sslallow"\
    action.rewtohttps(yes)
    request.header.cookie="sslallow" action.red(yes)
<ssl>
    condition=sslallow server.certificate.validate.ignore(all)
    define action mycookie
        set(exception.response.header.set-cookie,
            "sslallow$(url.cookie_domain)")
    end
    define action rewtohttps
        rewrite(url,"(.*)\?xyzallow","$(1)")
    end
end

```

```

define action red
  redirect(307, "(.*)", "$ (1)?xyzallow")
end

define condition sslallow
  url.substring="xyzallow"
end

define condition sslexception
  exception.id=ssl_server_cert_untrusted_issuer
  exception.id=ssl_server_cert_expired
  exception.id=ssl_domain_invalid
end

```

**Note:**

- ❑ For an invalid certificate, the xyzallow value is appended to the URL after user clicks on Accept. This is expected behavior.

**Question: How do I protect end-user privacy and prevent accidental exposure of sensitive information when intercepting SSL traffic?**

**Answer:**For intercepted SSL traffic, potentially sensitive information is available in cleartext in the following locations:

- ❑ If ICAP scanning is enabled for intercepted HTTPS traffic, such data is sent without encryption to the ICAP server.
- ❑ You can log request and response headers containing sensitive information to the access log and event log.
- ❑ If you use an off-box URL filtering solution, part of the URL may be sent in cleartext to the URL database service point. Note that such a service point can be located on the Internet.
- ❑ Intercepted HTTPS content that is cacheable is also available on the disk in the clear.

**Recommendation:** Take the following measures to prevent accidental exposure of sensitive information:

- Use care in determining which sites to intercept. Avoid intercepting well-known banking and financial sites. On-box URL databases and server certificate categories can be used in determining which sites to intercept.
- Use on-box URL databases, such as Blue Coat Web Filter or a third-part content filtering vendor, to avoid transmitting URLs in cleartext.
- Implement HTML notification for intercepted sites to inform end-users that their HTTPS traffic will be monitored and that they can opt-out if they do not want their traffic to be intercepted. HTML notification is also helpful if a site is accidentally intercepted.

For information on HTML Notification, refer to Chapter 6 of the *Blue Coat ProxySG Configuration and Management Guide*.

For information on Client Consent Certificates, refer to Chapter 6 of the *Volume 4: Securing the Blue Coat SG Appliance*.

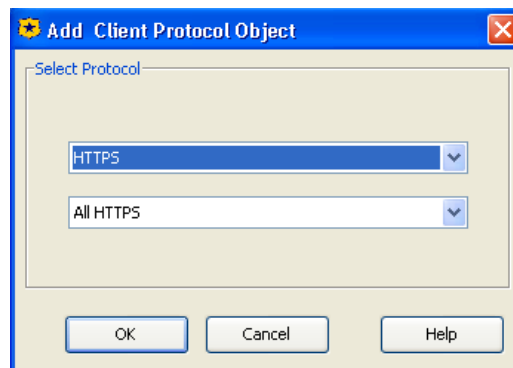
- If you use ICAP scanning for intercepted HTTPS content, make sure that the network link between the ProxySG and the ICAP server cannot be snooped.
- Do not log URL or header information for intercepted HTTPS traffic. (By default, the SSL log does not log this information.)

The ProxySG allows you to set up notification two ways, HTML notification and client consent certificates

## Setting up HTML Notification

**Procedure:** Set up HTML notification only for HTTPS sites:

1. Launch the Visual Policy Manager from Configuration > Policy > Visual Policy Manager.
2. Add a new rule to the Web Access layer.
  - a. Right click the Action field; select Set.
  - b. Click New, then select the Notify User object.
  - c. Customize the Notify User object as needed.
  - d. Click OK.
  - e. Click OK.
  - f. Right click the Service field; select Set.
  - g. Click New, then select the Client Protocol object.



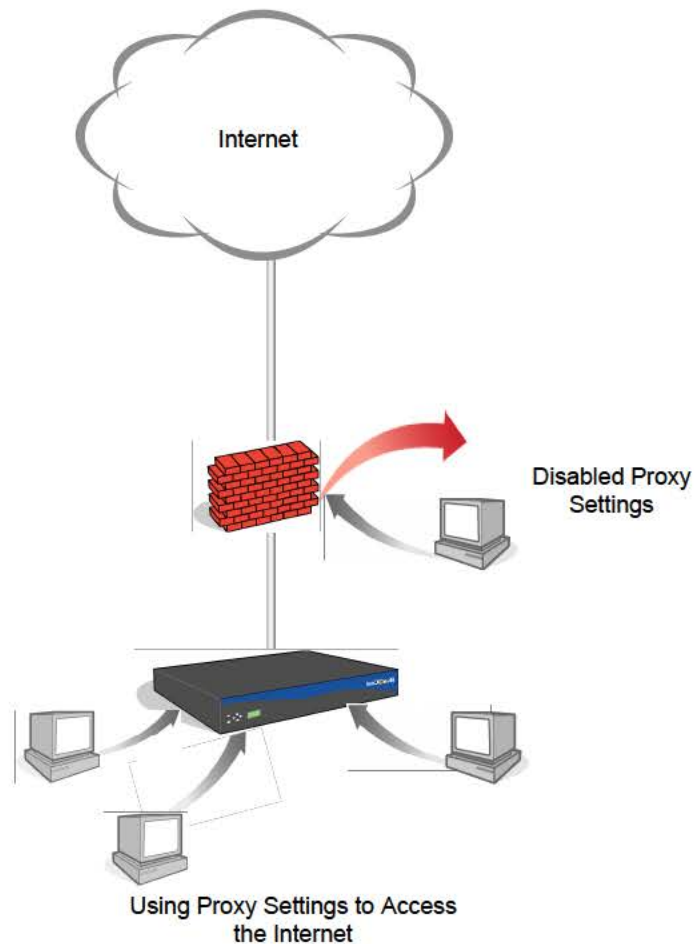
- h. Select HTTPS from the drop-down list in the top field; make sure ALL HTTPS is selected from the drop-down list in the lower field.
  - i. Click OK.
3. Click OK.
  4. Apply the policy by clicking Install Policy in the upper-right-hand corner.

### Question: How do I set up SSL Proxy in explicit mode?

**Answer:** The SSL Proxy can be used in explicit mode in collaboration with the HTTP Proxy or SOCKS Proxy. You must create an HTTP Proxy service or SOCKS Proxy service and use it as the explicit proxy from desktop browsers. When requests for HTTPS content are sent to either a SOCKS proxy or an HTTP proxy, the proxies can detect the use of the SSL protocol on such connections and enable SSL Proxy functionality. Note that SSL protocol detection should be enabled for the proxy service in use (HTTP or SOCKS).

To create an explicit SSL proxy, complete the following steps:

- ❑ Configure the browser on the desktop to use a proxy or point to a PAC file that points to the proxy.
- ❑ Coordinate with other devices, such as a firewall, to prevent users from accessing the internet without a proxy.
- ❑ Confirm that an HTTP proxy or SOCKS proxy service is present on the desired port and that protocol detection is enabled for that service.
- ❑ Create or import an issuer keyring or use the defaults.
- ❑ Configure SSL proxy rules through VPM.



**Question: How do I deploy SSL Proxy in transparent mode?**

**Answer:** In a transparent proxy configuration, neither the client (browser) nor the desktop knows that the traffic is being processed by a machine other than the origin content server (OCS). The browser believes it is talking to the OCS, so the request is formatted for the OCS; the proxy determines for itself the destination server based on information in the request, such as the destination IP address in the packet, or the Host: header in the request.

A transparent proxy requires one of the following:

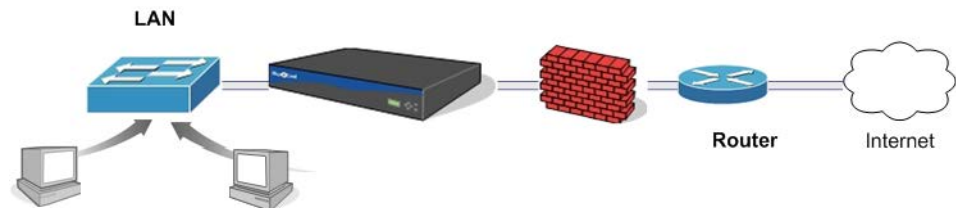
- ☐ A hardware bridge
- ☐ A WCCP switch
- ☐ An L4 switch



If you want to use an L4 switch, WCCP, or an explicit proxy instead of bridging, disable the bridging Pass-Thru card.

Bridging functionality allows ProxySG appliances to be deployed in environments where L4 switches, explicit proxies, and WCCP-capable routers are not feasible options.

A branch office that would take advantage of a bridging configuration is likely to be small (from 20 to 50 users); for example, it might have only one router and one firewall in the network, as shown below.

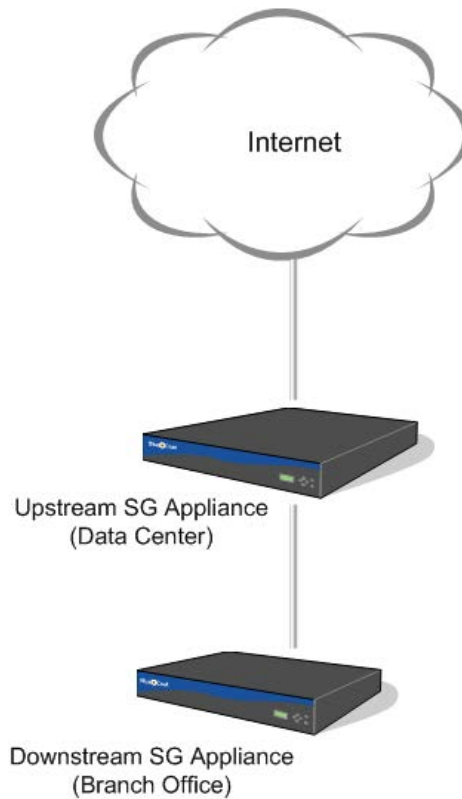


To create a transparent SSL proxy, configure the hardware to use a transparent proxy:

- ☐ Create an SSL service on port 443.
- ☐ Create or import an issuer keyring or use the defaults.
- ☐ Configure SSL proxy through VPM or CPL.

**Question: How do I deploy the SSL Proxy in a proxy chain?**

**Answer:** A typical SSL proxy chain is shown below.



The ProxySG at the branch office (the downstream device) uses the ProxySG at the data center (the upstream device) as its forwarding host, allowing SSL Proxy functionality to be enabled on both appliances.

### Tips on Setting Up SSL Proxy Chaining Functionality

- ❑ The upstream ProxySG is configured as the forwarding host of type “HTTP proxy” for the downstream ProxySG.
- ❑ Both proxies have identical SSL related policy; that is, each should make identical decisions in terms of which SSL connections are intercepted and which SSL connections are tunneled.
- ❑ The issuer certificate used by the upstream ProxySG to sign emulated certificates should be imported as a CA certificate on the downstream ProxySG. This ensures that the downstream device can successfully verify emulated certificates presented by the upstream device.

Note that this applies to intercepted SSL connections only. For tunneled SSL connections the downstream ProxySG sees the original server certificate.

Now, when an SSL connection is intercepted at the upstream appliance, the ProxySG emulates the server certificate and presents the emulated server certificate to the downstream ProxySG.

**For information on using forwarding hosts, refer to Volume 5 of the**  
*Volume 5: Advanced Networking.*

For information on creating TCP-tunnel services, refer to *Volume 2: Proxies and Proxy Services*.

**Question:** I am using a transparent proxy deployment. How do I allow non-SSL traffic on port 443 to certain servers while still enabling the SSL Proxy for other port 443 traffic?

**Answer:** Some legitimate applications, such as the SOCKS-based VPN clients from Aventail and Permeo, use port 443 to communicate to the VPN gateway. However, the protocol they use is not SSL. An SSL service created on port 443 that transparently terminates such TCP connections breaks these applications. That is because the SSL service enforces the use of the SSL protocol.

Administrators can allow such SOCKS-based VPN tunnels to a few trusted partner sites.

**Procedure:** To enable non-SSL protocols on port 443 for certain applications

1. Create a transparent TCP-tunnel service on port 443. Do not create an SSL service on port 443.
2. Specify the list of servers that can use port 443 for non-SSL protocols in policy:

```
define condition Trusted_non_ssl_servers
    url.address=1.1.1.1
    url.address=2.2.2.2
end condition Trusted_non_ssl_servers
```

3. Write a <proxy> layer that forces all other traffic on port 443 to use the SSL protocol:

```
<proxy>
    proxy.port=443 condition != Trusted_non_ssl_servers
    force_protocol(ssl)
```

These rules ensure that port 443 connections to the list of trusted servers are tunneled without intervention while all other port 443 connections use the SSL protocol.

**Question:** Windows updates fail when I use the SSL Proxy to intercept all SSL connections.

**Answer:** SSL connections for Windows updates should always be tunneled. For example:

```
<ssl-intercept>
server.certificate.hostname=update.microsoft.com \
    ssl.forward_proxy(no)
    ssl.forward_proxy(https)
```

The same policy can be created in VPM using the SSL Intercept Layer, the Server Certificate Object, and the SSL Forward Proxy object.

Note that you only need to do this if the policy intercepts everything. If you do selective interception, as recommended, this issue does not arise.

## Question: Can I use CA hierarchy for certificate emulation?

**Answer:** Some enterprises have a well-defined CA Certificate hierarchy (chain) in place. Consider the hypothetical example of Clothing-Max, a retail clothing outlet with 150 stores in the U.S. and Canada.

The Clothing-Max Root CA Certificate is at the top of the hierarchy and has issued a CA certificate for the Clothing-Max IT department. In turn, the IT department issues a CA certificate for the IT security team.

If the security team wants to deploy the SSL proxy using its CA certificate as the issuer for emulated certificates, the team will import this certificate and its private key on the ProxySG. Note that the intermediate CA must be imported in two places on the ProxySG:

- ❑ Under the “Keyrings” panel where both the private key and the certificate are stored.
- ❑ Under “CA Certificates” panel on ProxySG. This second step ensures that the SSL Proxy chains the intermediate CA certificate along with the emulated certificate.

The ProxySG now signs the emulated certificates using the private key of the Clothing-Max IT Security Team CA Certificate. The certificate chain for an emulated certificate for a Clothing-Max server will be:

Root CA	Intermediate CAs	Emulated Certificate
Clothing-Max	Clothing-Max IT Clothing-Max IT Security Team	Clothing-Max Server

In this case, the browser does not show a security pop-up if it is able to verify all certificates in the certificate hierarchy.

If you use Internet Explorer, additional requirements are necessary on the intermediate CA certificates in the certificate chain.

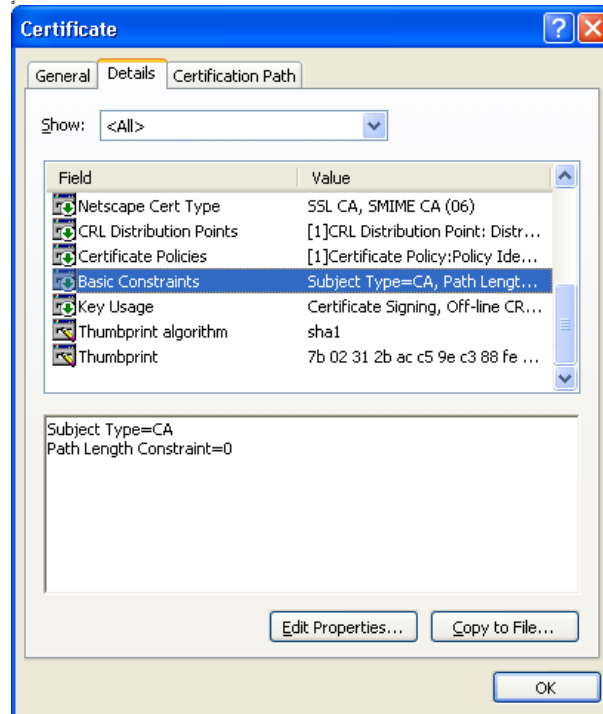
Intermediate CA certificates must contain the *basic constraints* certificate extension with the Subject Type set to CA. Also, if your intermediate CA certificate has a KeyUsage extension, make sure it has the “Certificate Signing” attribute present.

Root CA certificates are exempt from this requirement:

Root CA	Intermediate CA	Intermediate CA
Clothing-Max	Clothing-Max IT	Clothing-Max IT Security Team

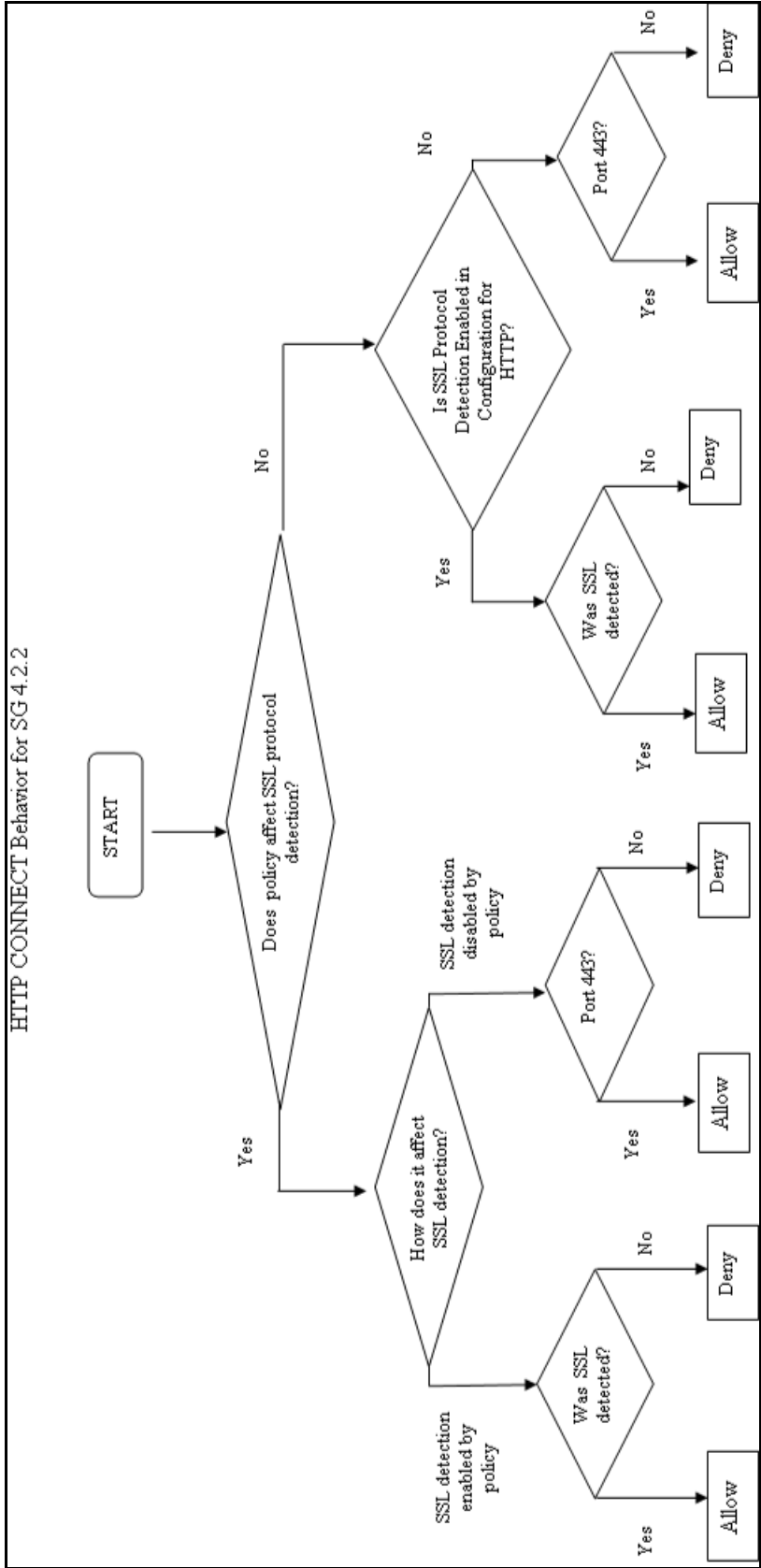
The illustration below shows a Verisign Class 2 Intermediate Certificate Basic Constraints Extension.

For detailed information on creating an Intermediate CA using OpenSSL, refer to Volume 2 of the *Volume 2: Proxies and Proxy Services*.



**Question:** How does the HTTP Proxy securely process the CONNECT method?

**Answer:**A.: It follows the rules outlined in the flow chart below.



## Question: How do I authenticate intercepted SSL traffic and add the username to the access log?

**Answer:** For transparent authentication, continue with the next section. For explicit authentication, skip to “Explicit Authentication” on page 35.

### Transparent Authentication

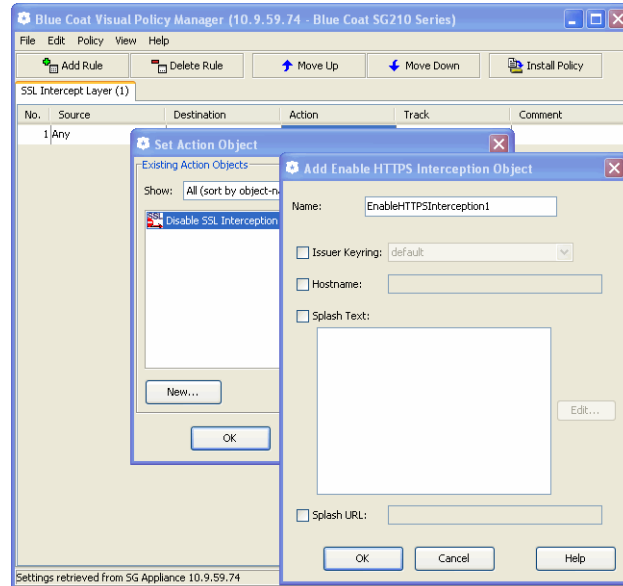
Complete the following steps on the ProxySG:

1. Create an authentication realm, such as LDAP, IWA, or RADIUS, based on the environment. (Management Console Location: **Configuration > Authentication > Realm\_Name**)
2. As part of realm authentication, change the virtual URL for the realm to <https://hostname:444>. The hostname, which must not be a fully qualified domain name, must resolve to the IP address of the ProxySG. (Management Console Location: **Configuration > Authentication > Realm\_Name > General**)
3. Make sure that transparent proxy is set to the session cookie method. This is the default. (Management Console Location: **Configuration > Authentication > Transparent Proxy**)
4. An HTTPS (SSL) Service already exists on the system by default. Modify the default HTTPS service, if needed, to intercept traffic on port 443. (Management Console Location: **Configuration > Services > Proxy Services > Encrypted Service Group > HTTPS > Edit Service**)
5. Create an HTTPS reverse proxy on the ProxySG so that connections to the virtual URL are intercepted by the ProxySG (Management Console Location: **Configuration > Services > Proxy Services > Reverse Proxy Service Group > New Service**)
6. (Optional) If you use a TCP-tunnel service on 443 in transparent mode instead of the SSL service, enable protocol detection on the TCP-tunnel service. (Management Console Location: **Configuration > Services > Proxy Services > Other Service Group > New Service**)
7. The following steps describe how to write policy to enable SSL Proxy functionality using the Visual Policy Manager. For an example of policy using CPL, see “Sample CPL for Transparent Authentication” on page 34.
  - a. From the Management Console, launch the Visual Policy Manager: **Configuration > Policy > Visual Policy Manager > Launch**
  - b. From the **Policy** menu, select **Add SSL Intercept Layer**.

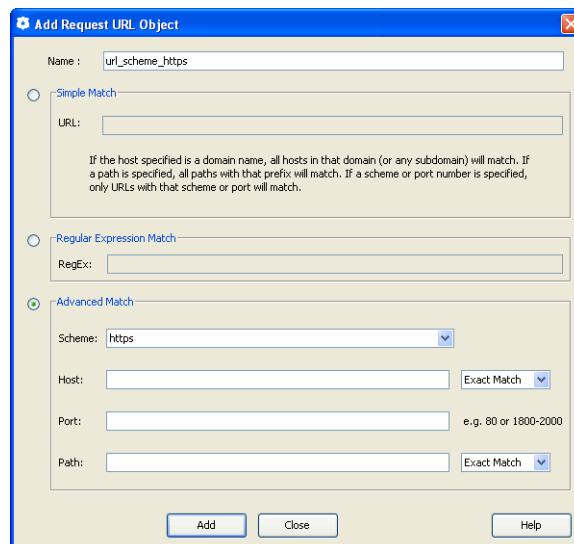
**Note:** For more information about authentication modes, refer to *Volume 4: Securing the Blue Coat SG Appliance*.

**Note:** For more information about creating policy, refer to *Volume 10: Content Policy Language Guide*

- c. Right-click the **Action** cell and select **Set**. Click **New** and select **Enable HTTPS Interception**.

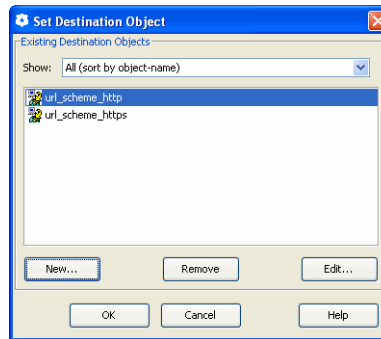


- d. Click **OK** to add the interception object, and then click **OK** to close the Set Action Object dialog.
- e. From the **Policy** menu, select **Add Web Authentication Layer**. You will be creating a combined object containing two Request URL objects: HTTPS, and HTTP.
- f. Right-click the **Destination** cell and select **Set**. Click **New** and select **Request URL**.
- g. Select **Advanced Match**. In the **Name** field, type **url\_scheme\_https**. From the **Scheme** drop-down list, select **https**.



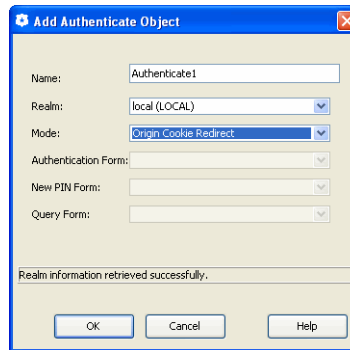


- h. Click **Add** to add the Request URL Object for HTTPS.
- i. Now, repeat the same procedure to add a Request URL Object for HTTP. Select **Advanced Match**. In the **Name** field, type **url\_scheme\_http**. From the **Scheme** drop-down list, select **http**.
- j. Click **Add** and then **Close**. You should now see both **url\_scheme\_http** and **url\_scheme\_https** in the Set Destination Object dialog.

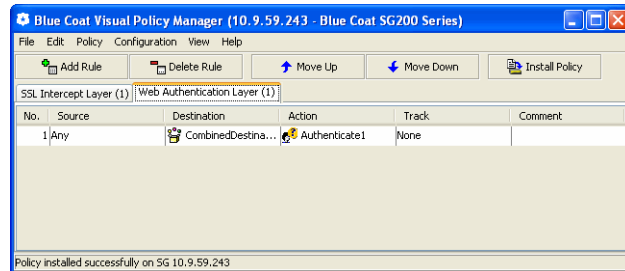


- k. Click **New** and select **Combined Destination Object**.
- l. Shift-click to select both **url\_scheme\_http** and **url\_scheme\_https** and then click **Add**.
- m. Click **OK** to add the Combined Destination Object to the Web Access Layer, and then click **OK** to close the Set Destination Object dialog.
- n. Right-click the **Action** cell and select **Set**.
- o. Click **New** and select **Authenticate**.
- p. Specify the desired **Realm** and select a redirect **Mode**:
  - *origin-cookie-redirect*, where the client is redirected to a virtual URL to be authenticated, and cookies are used as the surrogate credential.
  - *origin-ip-redirect* (insecure), where the client is redirected to a virtual URL to be authenticated, and the client ip\_address is used as a surrogate credential.
  - *form-cookie-redirect*, where a form is presented to collect the user's credentials. The user is redirected to the authentication virtual URL before the form is presented.
  - *form-ip-redirect* (insecure), where the user is redirected to the authentication virtual URL before the form is presented.

In this example, the local realm is set to Origin-Cookie-Redirect.



- q. Click **OK** to add the Authenticate Object, and then click **OK** to close the Set Destination Object dialog.
- r. In the Visual Policy Manager, click **Install Policy**.



8. Add the access log field **cs-username** to the SSL access log format.  
(Management Console Location: **Configuration > Access Logging > Formats > SSL > Edit**)

### Sample CPL for Transparent Authentication

You can also use the CPL to write policy. In this example, realm name is called *local* and the authentication mode is *origin-cookie-redirect*:

```
<ssl-intercept>
  ssl.forward_proxy (https)

<Proxy>
  authenticate(local) authenticate.mode(origin-cookie-
  redirect)

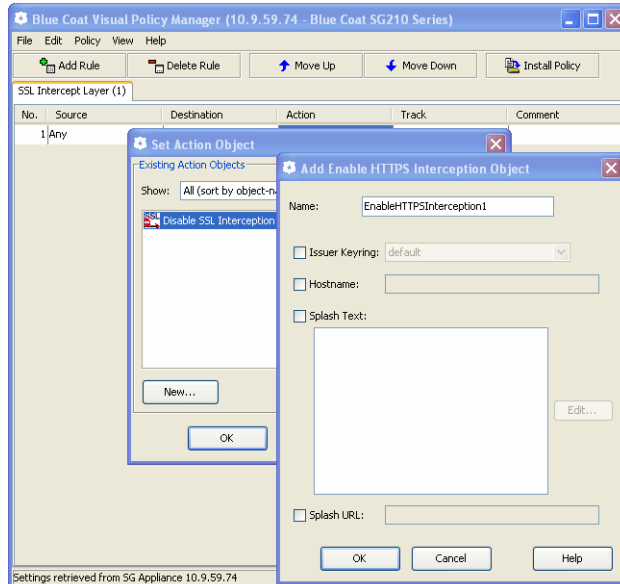
;Definitions
define condition client_protocol
  client.protocol=https
  client.protocol=http
end
```

## Explicit Authentication

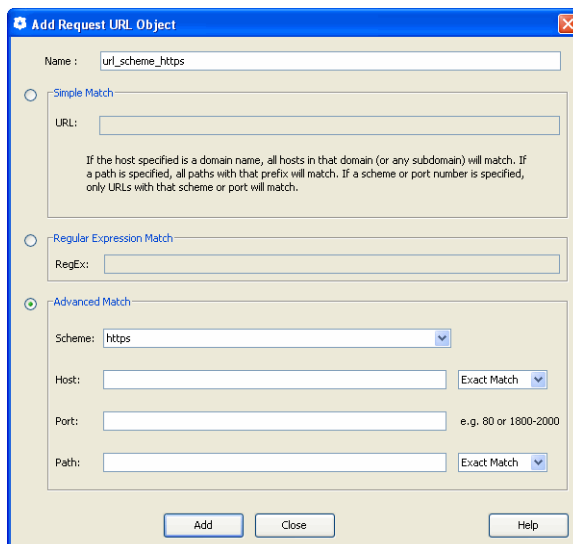
Complete the following steps on the ProxySG:

1. Create an authentication realm, such as LDAP, IWA, or RADIUS, based on the environment. (Management Console Location: **Configuration > Authentication > Realm\_Name**)
2. As part of realm authentication, change the virtual URL for the realm to <https://hostname:444>. The hostname, which must not be a fully qualified domain name, must resolve to the IP address of the ProxySG. (Management Console Location: **Configuration > Authentication > Realm\_Name > General**)
3. Create an HTTP proxy service that is the explicit proxy from desktop browsers (Management Console Location: **Configuration > Services > Proxy Services > New Service**):
  - Give the service a meaningful name.
  - Select the Service Group where you want the service to live.
  - Enable the Detect Protocol attribute.
  - Configure a new listener with an explicit destination address.
4. Create an HTTPS reverse proxy on the ProxySG so that connections to the virtual URL are intercepted by the ProxySG (Management Console Location: **Configuration > Services > Proxy Services > Reverse Proxy Service Group > New Service**).
5. The following steps describe how to write policy to enable SSL Proxy functionality using the Visual Policy Manager. For an example of policy using CPL, see “Sample CPL for Explicit Authentication” on page 38.
  - a. From the Management Console, launch the Visual Policy Manager: **Configuration > Policy > Visual Policy Manager > Launch**
  - b. From the **Policy** menu, select **Add SSL Intercept Layer**.

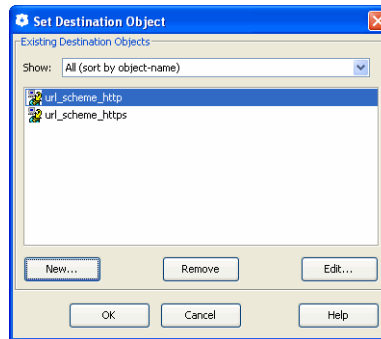
- c. Right-click the **Action** cell and select **Set**. Click **New** and select **Enable HTTPS Interception**.



- d. Click **OK** to add the interception object, and then click **OK** to close the Set Action Object dialog.
- e. From the **Policy** menu, select **Add Web Authentication Layer**. You will be creating a combined object containing two Request URL objects: HTTPS, and HTTP.
- f. Right-click the **Destination** cell and select **Set**. Click **New** and select **Request URL**.
- g. Select **Advanced Match**. In the **Name** field, type **url\_scheme\_https**. From the **Scheme** drop-down list, select **https**.

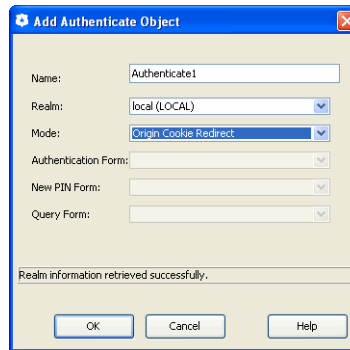


- h. Click **Add** to add the Request URL Object for HTTPS.
- i. Now, repeat the same procedure to add a Request URL Object for HTTP. Select **Advanced Match**. In the **Name** field, type **url\_scheme\_http**. From the **Scheme** drop-down list, select **http**.
- j. Click **Add** and then **Close**. You should now see both **url\_scheme\_http** and **url\_scheme\_https** in the Set Destination Object dialog.

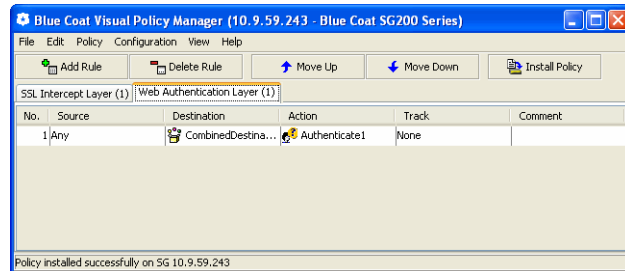


- k. Click **New** and select **Combined Destination Object**.
- l. Shift-click to select both **url\_scheme\_http** and **url\_scheme\_https** and then click **Add**.
- m. Click **OK** to add the Combined Destination Object to the Web Access Layer, and then click **OK** to close the Set Destination Object dialog.
- n. Right-click the **Action** cell and select **Set**.
- o. Click **New** and select **Authenticate**.
- p. Specify the desired **Realm** and select a redirect **Mode**:
  - *origin-cookie-redirect*, where the client is redirected to a virtual URL to be authenticated, and cookies are used as the surrogate credential.
  - *origin-ip-redirect* (insecure), where the client is redirected to a virtual URL to be authenticated, and the client ip\_address is used as a surrogate credential.
  - *form-cookie-redirect*, where a form is presented to collect the user's credentials. The user is redirected to the authentication virtual URL before the form is presented.
  - *form-ip-redirect* (insecure), where the user is redirected to the authentication virtual URL before the form is presented.

In this example, the local realm is set to Origin-Cookie-Redirect.



- q. Click **OK** to add the Authenticate Object, and then click **OK** to close the Set Destination Object dialog.
- r. In the Visual Policy Manager, click **Install Policy**.



6. Add the access log field **cs-username** to the SSL access log format.  
(Management Console Location: **Configuration > Access Logging > Formats > SSL > Edit**)

### Sample CPL for Explicit Authentication

You can also use the CPL to write policy. In this example, realm name is called *local* and the authentication mode is *origin-cookie-redirect*:

```
<ssl-intercept>
  ssl.forward_proxy (https)

<Proxy>
  condition=client_protocol http.method=!CONNECT
  authenticate(local) authenticate.mode(origin-cookie-
  redirect)

;Definitions
define condition client_protocol
  client.protocol=https
  client.protocol=http
end
```

# Troubleshooting Tips

If a site is rejected by the ProxySG, it does not necessarily mean the certificate is self-signed or not valid.

Certificates not signed by a commercial signing authority, such as those signed by the United States Department of Defense, are rejected until the CA is added to the ProxySG's store.

## Can't Reach an HTTPS Site

**Description:** A request to an HTTPS site results in a failure to reach the site and the browser displays an HTML error page that describes a certificate error. In the ProxySG event log, one of the following is displayed:

```
"Server certificate validation failed for
support.bluecoat.com at depth 0, reason Untrusted Issuer" 0
310000:1 ../ssl_proxy/sslproxy_worker.cpp:1157

"Server certificate validation failed for www.etrade.com at
depth 0, reason Certificate expired or not valid yet" 0
310000:1 ../ssl_proxy/sslproxy_worker.cpp:1157
```

**Solutions:**

**Option 1 (Most Secure):**

- ❑ For untrusted issuer errors:

Get the CA certificate from the server administrator and import it to the ProxySG. This is secure only if you can trust the CA's policies when they issue server certificates. When validating the new server certificate, make sure that a new browser instance is used.

- ❑ For expired certificate errors:

- First check the clock on your proxy. Since the expiration check compares the dates in the certificate against the proxy's clock, make sure that the correct date and time is set.
- If you still get certificate expired errors, the most secure solution is to get a new certificate with valid dates. This may not be possible if you do not control the server.

**Option 2 (Less Secure):**

Create and install policy to ignore specific errors.

- ❑ To ignore untrusted issuer errors

```
<ssl>
server_url.host="intranet.company.com" \
server.certificate.validate.ignore.untrusted_issuer(yes)
```

This problem only affects Internet Explorer. Other browsers do not have this issue.

- ❑ To ignore certificate expiration errors:

```
<ssl>
server_url.host="intranet.company.com" \
server.certificate.validate.ignore_expiration(yes)
```

## Upgrading and Using SSL Client Certificates with Internet Explorer

After upgrading to SGOS 4.2.x or higher, client certificate authentication can stop working with Internet Explorer if the HTTPS reverse proxy service in question is not using a CA-Certificate List (CCL). This is because IE cannot handle the long list of CAs presented by SG in the handshake messages.

### Problem: Client certificates do not work with Internet Explorer

*Description:* When the ProxySG requests a client certificate from the browser, it includes the list of CAs it trusts in the “Certificate Request” message. The default list of CA certificates configured on the ProxySG has grown and now spans multiple SSL records. Internet Explorer cannot handle SSL handshake messages that span multiple SSL records.

*Solutions:*

- ❑ For the SSL Proxy, this issue means that the client consent certificate feature that allows the ProxySG to notify users in advance of HTTPS interception does not work with Internet Explorer. No workaround exists.
- ❑ For the HTTPS Reverse Proxy, you can create a CCL, which reduces the number of CAs trusted by a service to the point where Internet Explorer can handle it.

### Problem: How to use client certificates to communicate with servers using the SSL Proxy

*Description:* When the SSL Proxy is intercepting HTTPS traffic, requests to a HTTPS site result in failure if the server requires a client certificate.

*Solution:* You can use client certificates to communicate with the server when the SSL proxy is used in tunnel mode. You cannot use client certificates to communicate with the server when the SSL proxy is intercepting traffic.

## Logging

### Problem: How to include other information in the SSL access log

*Description:* The default access log fields for the SSL log do not contain any sensitive information. Only information that can be seen in the clear on the wire is included in the SSL access log.

*Solution:* The SSL access log is customizable, meaning that you can add fields that containing sensitive information. For more information on configuring access logs,



refer to Chapter 21 in the *Blue Coat ProxySG Configuration and Management Guide*.

### **Problem: SSL access log contains no data**

*Description:* When you intercept and log all traffic, the log remains empty.

*Solution:* You might be logging all https-forward-proxy connections (that is, intercepted connections) to the main facility instead of the SSL facility.

## **Microsoft**

### **Problem: Windows Update**

*Description:* Windows Update fails when the SSL Proxy intercepts Windows Update connections. This is because Windows Update does not trust the emulated certificate presented by the SSL Proxy.

*Solution:* Always tunnel SSL connections for Windows Update.

```
<ssl-intercept>
  server.certificate.hostname=update.microsoft.com \
  ssl.forward_proxy(no)
  ssl.forward_proxy(https)
```

### **Problem: Login through HTTP with MSN IM client fails**

*Description:* Logging in to the MSN IM client fails if the SSL Proxy is intercepting HTTP traffic, and the proxy does not display a certificate pop-up. This is because the IM client does not trust the emulated certificate presented by the SSL Proxy.

*Solution:* Write policy to disable SSL interception for login.live.com, such as:

```
ssl-intercept>
  condition=!DoNotInterceptList ssl.forward_proxy(https)
; Definitions
define condition DoNotInterceptList
  server.certificate.hostname=login.live.com
  server.certificate.hostname=loginnet.passport.com
end
```

*Solution:* Import the ProxySG's issuer certificate as trusted in the browser.

## **SKYPE**

### **Problem: How to allow Skype for a specific user**

*Description:* While Skype uses HTTP and SSL as transport protocol, the application content is proprietary to Skype and does not adhere to HTTP standards.

*Solution:* To allow Skype for a specific user:

- ❑ Create a firewall policy that denies clients from going directly to the Internet.

- ❑ Allow only the ProxySG to connect to the Internet for HTTP, HTTPS and FTP services.
- ❑ Install SGOS 4.2.2 or higher with a valid SSL proxy license.
- ❑ Ensure that the ProxySG has SSL detection enabled for HTTP CONNECT, SOCKS, and TCP Tunnel under Configuration > Services > SSL Proxy.
- ❑ Verify the policy as described in *Verifying Skype Request Blocking* in the following TechBrief:

[http://www.bluecoat.com/downloads/support/tb\\_skype.pdf](http://www.bluecoat.com/downloads/support/tb_skype.pdf)

## Error Messages

### Problem: How do I decipher error messages?

**Description:** How do error messages indicate whether the ProxySG was acting as an SSL server or as an SSL client?

**Solution:** When reading SSL-related event log messages, remember that:

- ❑ If an error message begins with CFSSL:SSL\_accept error, that means the ProxySG encountered errors on the client-side connection when acting as an SSL server.
- ❑ If an error message begins with CFSSL:SSL\_connect error, that means the ProxySG encountered errors on the server side or upstream connection when acting as an SSL client.

For example, the following are errors when the ProxySG was acting as an SSL server:

```
2007-06-05 21:43:57+02:00CEST "CFSSL:SSL_accept
error:1408E0F4:SSL routines:SSL3_GET_MESSAGE:unexpected
message" 0 310000:1 ../cf_ssl.cpp:1505

2007-06-05 21:44:03+02:00CEST "CFSSL:SSL_accept
error:14089087:SSL
routines:SSL3_GET_CLIENT_CERTIFICATE:cert length mismatch"
0 310000:1 ../cf_ssl.cpp:1505
```

The following are errors when the ProxySG was acting as an SSL client:

```
2007-06-05 21:43:57+02:00CEST "CFSSL:SSL_connect
error:1408E0F4:SSL routines:SSL3_GET_MESSAGE:unexpected
message" 0 310000:1 ../cf_ssl.cpp:1505

2007-06-05 21:44:03+02:00CEST "CFSSL:SSL_connect error:
1408E10B: SSL routines: SSL3_GET_SERVER_HELLO: wrong ssl
version" 0 310000:1 ../cf_ssl.cpp:1505
```