Cisco IOS SSL VPN Gateways and Contexts

1. Overview

This document provides configuration guidance for users of Cisco IOS® SSL VPN. This feature is designed to terminate SSL VPN connections on Cisco IOS Software-based routers (1800, 2800, 3700, 3800, 7200, and 7301). SSL VPN is comparable to and complements the popular IP Security (IPsec) remote-access VPN.

The testing was performed at the NSITE lab in Research Triangle Park, North Carolina (RTP) on the devices defined above. The objective of the testing was to configure and test the uses of WebVPN gateways, and how they work with contexts. Basically, we will look at how the WebVPN gateway is used and applied with the context. We will also look at how each setup is used from the end-user perspective.

This document discusses some of the configuration concepts and usage. The gateway and context are the two main configuration modes for a Cisco IOS SSL VPN service.

Note: All Cisco IOS SSL VPN/WebVPN features are included in a single, cost-effective license that would be purchased separately. You can purchase the feature license in packs of 10, 25, or 100 simultaneous users directly from the Cisco.com configuration tool. If you already have a router, use the following SKUs to order the license: FL-WEBVPN-10-K9=, FL-WEBVPN-25-K9=, FL-WEBVPN-100-K9=. Check the data sheet to find the maximum supported users for your platform.

2. Audience

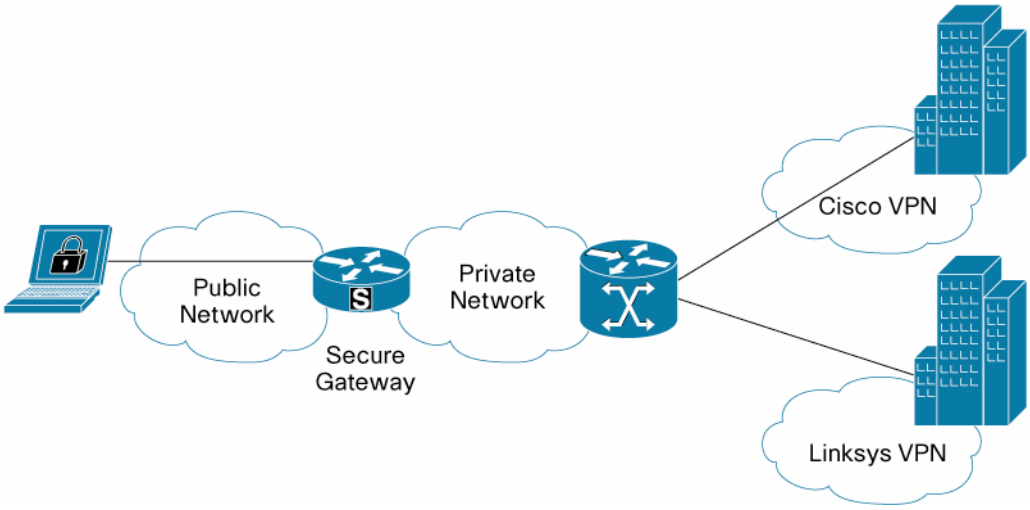
This configuration guide is intended for customers and partners working to provide configuration guidelines and best practices for smaller SSL VPN deployments.

3. Network Topology

Figure 1 shows a basic Cisco IOS SSL VPN topology.

Figure 1. Basic SSL VPN Topology

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.



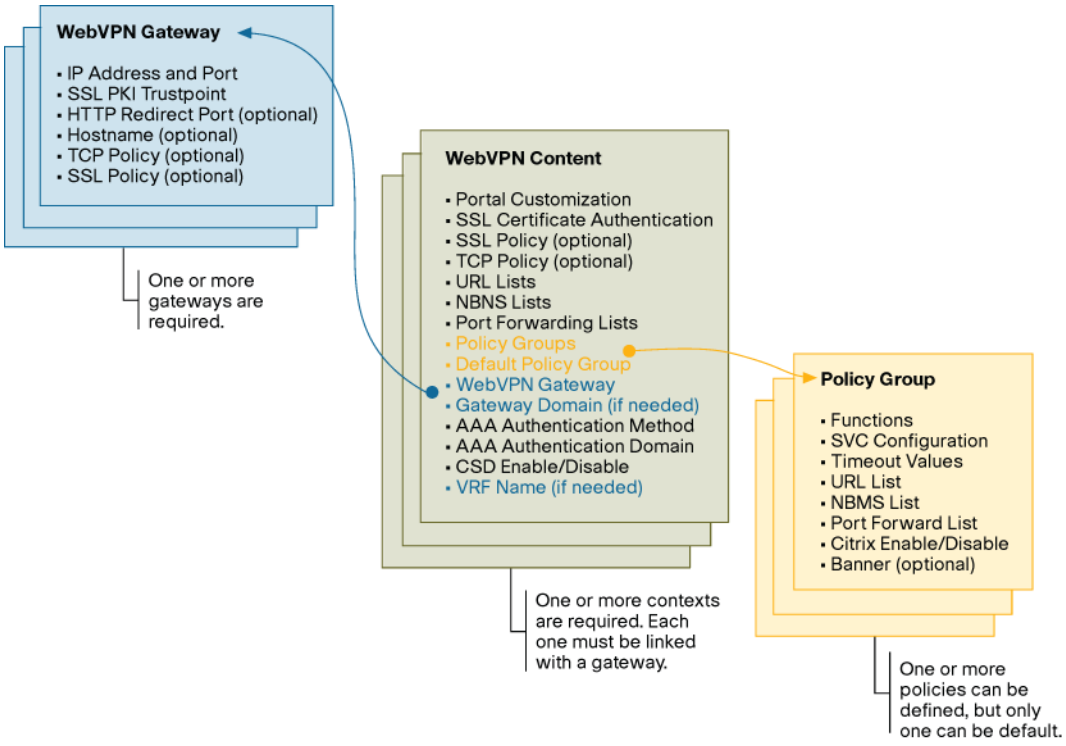
4. WebVPN Configuration

4.1 Configuration Overview

This document only considers the configuration of the WebVPN gateway, contexts, and how these components work together.

Figure 2 shows how the gateways, contexts, and policy groups are related. You can also see that the context is the main focus for the user sessions. The gateway is just the destination IP endpoint for the user session, and the context is where the policy group is defined and applied to the user session. The policy group determines the parameters of the user session, and how the session will behave.

Figure 2. Cisco IOS SSL VPN Configuration Map



All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

4.2 WebVPN Gateway

The WebVPN Gateway is used to terminate the SSL connection from the user. The basic configuration requires an IP address on the same subnet as one of the public network interfaces; this could be the same address used on the public network interface, or another address in the same subnet. Alternately, you can define a loopback interface, and use an address in that subnet, just as long as the address is reachable on the public network.

The other mandatory component is the crypto PKI trustpoint used. This can be a Certificate Authority (CA) signed certificate, or a self-signed certificate. This is discussed in more detail in the next subsections.

Optionally, you may provide a hostname that is associated with the gateway, since there may be multiple WebVPN gateways. It is also a common practice to register the addresses and hostnames with a DNS authority.

Note: The **inservice** command is comparable to the **no shutdown** command in Cisco IOS Software configurations.

```
webvpn gateway ssl-gw1
hostname sslvpn1
ip address 172.18.143.195 port 443
ssl trustpoint TP1
inservice
!
```

Note: The **hostname** command is only locally significant. You must register a hostname on a global DNS server for users to be able to use this name.

4.2.1 Certificate Authority (CA) Signed Certificates

There are two methods to setting up a CA with Cisco IOS SSLVPN. First, we can use a true trusted third-party certificate, like Verisign, which has advantages, but costs money for the certificate. It allows the client side to automatically verify the authenticity of the certificates used in the SSL connection. Alternately, you can set up your own private CA (Windows 2003 Server with SCEP add-on, Cisco IOS CA, etc.), and manually distribute the root certificate to the SSL VPN users. This is cheaper, but requires manual distribution of the root certificate for automatic verification of the SSL connection. See Appendix B for more information to setup a PKI trustpoint with the CA server.

Regardless of the CA method you choose, the trustpoint must be defined for the gateway to use it. If using multiple gateways, it is a good practice to define one trustpoint per gateway. This is mainly because the DNS hostname is included in the signed certificate used in tunnel mode. When a user browses to the WebVPN gateway, the URL of the WebVPN gateway should match the name in the certificate, or it will flag an error, which may become bothersome for users. It is best to have a clean session establishment.

The sample below shows two WebVPN gateways, which have different addresses in the same subnet and share the same trustpoint. They can be in separate subnets, as long as the address is reachable through the public network, and the subnet corresponds to that of another interface on the device.

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

```
webvpn gateway ssl-gw1
 hostname sslvpn1
 ip address 172.18.143.195 port 443
 ssl trustpoint TP1
 inservice
 !
webvpn gateway ssl-gw2
 hostname sslvpn2
 ip address 172.18.143.196 port 443
 ssl trustpoint TP2
 inservice
 !
```

4.2.2 Self-Signed Certificates

The alternative to using a CA server is to use the self-signed certificate. If you do not define a trustpoint before configuring the WebVPN gateway, a self-signed certificate will be generated for this gateway, and automatically assigned to it. This is the most painless way to set up Cisco IOS SSL VPN; however, this is not a globally known certificate. Therefore, any user initiating a tunnel mode session will always be asked if they want to trust the certificate, which may become bothersome for users.

```
sslvpn1(config)#webvpn gateway gw1
sslvpn1 (config-webvpn-gateway)#
*Jul 31 19:18:15.284: %PKI-4-NOAUTOSAVE: Configuration was modified.
Issue "write memory" to save new certificate
sslvpn1(config-webvpn-gateway)#end
```

By defining the WebVPN gateway, the trustpoint was automatically generated.

```
crypto pki trustpoint TP-self-signed-2025518488
 enrollment selfsigned
 subject-name cn=IOS-Self-Signed-Certificate-2025518488
 revocation-check none
 rsakeypair TP-self-signed-2025518488
!
crypto pki certificate chain TP-self-signed-2025518488
 certificate self-signed 01
!
webvpn gateway gw1
 ssl trustpoint TP-self-signed-2025518488
 no inservice
```

Note: The trustpoint will be automatically generated when a WebVPN gateway or HTTPS server is configured. More information can be found at: http://www.cisco.com/en/US/products/sw/iosswrel/ps5207/products_feature_guide09186a008040adf0.html

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

4.3 WebVPN Context

The WebVPN context is where the SSL VPN is terminated, and the user's VPN session is established. The context also contains all of the policies that can be applied to a user, including authentication, authorization, and accounting (AAA), virtual routing and forwarding instances (VRFs), and group policies. This is where the user authentication takes place, and group policies are applied to the user session. Furthermore, the context can define the way the SSL VPN Web portal will appear to the user by specifying the colors and the images. The context is basically a container for user sessions.

The WebVPN context uses a WebVPN gateway for the SSL session termination endpoint IP address. Multiple contexts can use one WebVPN gateway by using the *domain* keyword, and specifying a label.

4.3.1 WebVPN Context Configuration—One Gateway, One Context

The context configuration sample below shows two basic WebVPN contexts, one in clientless mode, and the other in tunnel mode configuration. This is just to illustrate the way the WebVPN gateway and context tie together. Basically, with this configuration, the context is the only one that will use the gateway. This is the 1:1 model.

```
webvpn context vpn1
 ssl authenticate verify all
 !
 url-list "eng"
   url-text "wwwin-eng" url-value "http://wwwin-eng.cisco.com"
 !
 policy group vpn1
   url-list "eng"
 !
 default-group-policy vpn1
 gateway ssl-gw1
 inservice
!
webvpn context vpn2
 ssl authenticate verify all
 !
 policy group vpn2tunnel
   functions svc-enabled
    svc address-pool "ssl_addr_pool1"
 !
 default-group-policy vpn2tunnel
 gateway ssl-gw2
 inservice
!
```

Note: The configurations above do not include the configuration of VRF on the contexts. If you need to use internal VRF instances, add the command "**vrf** *vrf-name*" to the context configuration.

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

4.3.2 Context Configuration—One Gateway, Multiple Contexts

The context configuration sample below shows two basic WebVPN contexts, one in clientless mode, and the other in tunnel mode configuration. This time, we illustrate the way one WebVPN gateway can be used by multiple contexts. Basically, with this configuration, the contexts are both using the gateway, and the appropriate context is selected by the *domain* keyword. This is the 1:N model.

```
webvpn context vpn1
 ssl authenticate verify all
 !
 url-list "eng"
   url-text "wwwin-eng" url-value "http://wwwin-eng.cisco.com"
 !
 policy group vpn1
   url-list "eng"
 !
 default-group-policy vpn1
 gateway ssl-gw1 domain cisco
 inservice
!
webvpn context vpn2
 ssl authenticate verify all
 !
 policy group vpn2tunnel
   functions svc-enabled
   svc address-pool "ssl_addr_pool2"
 !
 default-group-policy vpn2tunnel
 gateway ssl-gw1 domain nsite
 inservice
!
```

Note: The configurations above do not include the configuration of VRF on the contexts. If you need to use internal VRF instances, add the command "**vrf** *vrf-name*" to the context configuration.

5. Accessing WebVPN from the Public Network

This section discusses the various ways an end user initiates the SSL VPN session, and what actually happens.

5.1 One Gateway, One Context

This example uses the configuration displayed below. There are two contexts: one setup for clientless mode, and the second setup for tunnel mode. There are also two gateways, each corresponding to one of the contexts. With a sample configuration to work with, we will look at how this is used by end users to build the SSL VPN sessions.

```
webvpn gateway ssl-gw1
 ip address 172.18.143.195 port 443
 hostname webvpn1
```

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

```
 ssl trustpoint TP1
 inservice
 !
webvpn gateway ssl-gw2
 ip address 172.18.143.196 port 443
 hosthame sslvpn1
 ssl trustpoint TP2
 inservice
 !
webvpn context vpn1
 ssl authenticate verify all
 !
 url-list "eng"
   url-text "wwwin-eng" url-value "http://wwwin-eng.cisco.com"
 !
 policy group vpn1
   url-list "eng"
 !
 default-group-policy vpn1
 gateway ssl-gw1
 inservice
!
webvpn context vpn2
 ssl authenticate verify all
 !
 policy group vpn2tunnel
   functions svc-enabled
   svc address-pool "ssl_addr_pool2"
 !
 default-group-policy vpn2tunnel
 gateway ssl-gw2
 inservice
!
```

This is the easiest setup to use. The end user simply has to enter the IP address or DNS name of the gateway in the Web browser. Since the gateway is only used by one context, the user will automatically be moved into the corresponding context. The user will still need to be authenticated by the AAA method specified in the context. Since the AAA method has not been specified, the default authentication method will be used. In this case it will be local authentication.

For a user to log into these contexts, they simply have to enter the URL in the Web browser. For the two contexts shown in the example, these would be either https://172.18.143.195, and https://172.18.143.196. Typically, these would be regular DNS names, so they would be https://sslvpn1, and https://sslvpn2 respectively.

5.2 One Gateway, Multiple Contexts

This example uses the configuration displayed below. There are two contexts: one setup for clientless mode, and the second setup for tunnel mode. There is only one gateway for this

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

example, with both contexts using it. With a sample configuration to work with, we will look at how this is used by end users to build the SSL VPN sessions.

```
webvpn gateway ssl-gw1
 ip address 172.18.143.195 port 443
 hostname webvpn1
 ssl trustpoint TP1
 inservice
 !
webvpn context vpn1
 ssl authenticate verify all
 !
 url-list "eng"
   url-text "wwwin-eng" url-value "http://wwwin-eng.cisco.com"
 !
 policy group vpn1
   url-list "eng"
 !
 default-group-policy vpn1
 gateway ssl-gw1 domain cisco
 inservice
!
webvpn context vpn2
 ssl authenticate verify all
 !
 policy group vpn2tunnel
   functions svc-enabled
   svc address-pool "ssl_addr_pool2"
 !
 default-group-policy vpn2tunnel
 gateway ssl-gw1 domain linksys
 inservice
!
```

This setup is more difficult from a user perspective. The end user has to enter the IP address or DNS name of the gateway in the Web browser, followed by a domain string. Since the gateway is used by both contexts, the user has to select which context to use. This is done using the domain string as a selector of the context using the gateway. Once the correct context is located under the gateway, the user is moved into that context. The user will still need to be authenticated by the AAA method specified in the context. Since we have not specified the AAA method, the default authentication method will be used. In this case, it will be local authentication.

For a user to log into these contexts, they simply have to enter the URL, followed by the */domain*, in the Web browser. For the two contexts shown in this example, these would be either https://172.18.143.195/cisco, and https://172.18.143.196/linksys. Typically, these would be regular DNS names, so they would be https://sslvpn1/cisco, and https://sslvpn2/linksys respectively.

6. SSL VPN Session Establishment

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

6.1 End-to-End User Data Flow

Figure 3 shows the sequence of events that take place when a user establishes an SSL VPN session to the IOS SSL VPN router.

Figure 3. End-to-End SSL VPN

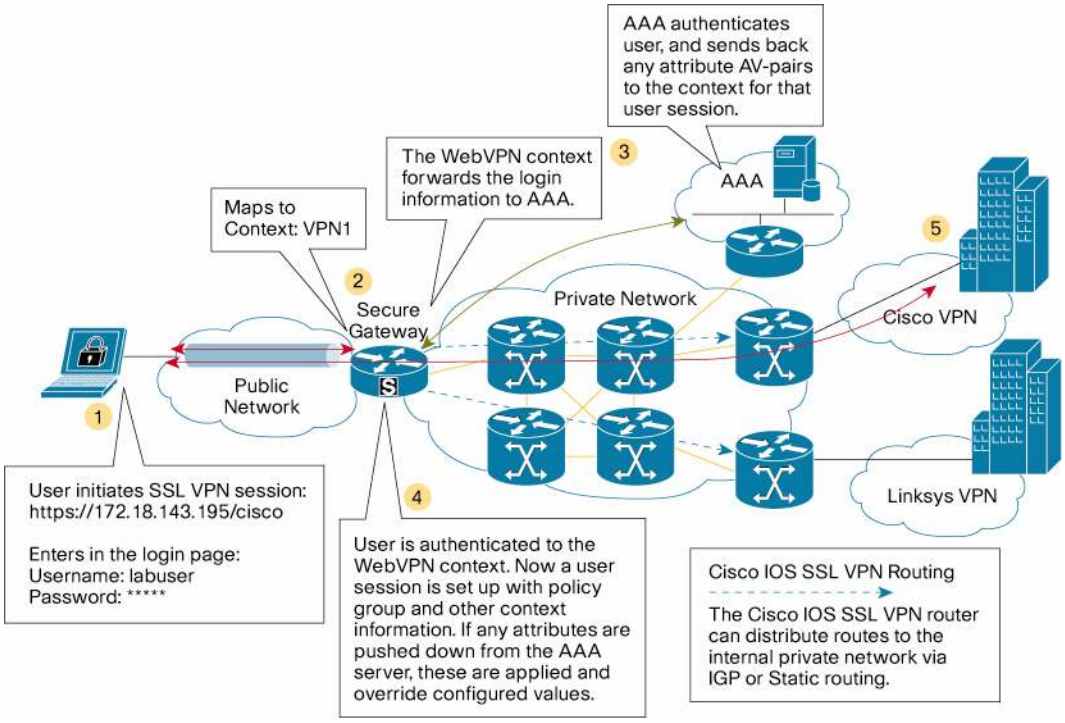


Figure 3 shows how the end-to-end SSL VPN is established. This basically applies to all SSL VPN modes.

1. The end user initiates the SSL VPN connection to the WebVPN gateway. This can be a DNS name or IP address. Depending on the method being used to log into the gateway, the user will have to enter the username and password.
2. The context a user is attempting to connect to is identified by the URL or login information. Now the user must be authenticated under the context they belong to.
3. The secure gateway must determine if it will let this user into the WebVPN context, so it will send the username and password to the AAA server. The method of AAA does not matter, just so authentication can be done.
4. If the AAA server authenticates the user, it will indicate this to the context. It may also push down any RADIUS attributes for that user. The WebVPN context will build a user session under the context, and apply the policy group information and RADIUS attributes. Now the workflow changes depending on the policy group parameters applied to the user session.
   - If the user is using Clientless mode, which is the default mode for a context, the process is complete. The WebVPN portal will now be displayed to the end user in the Web browser. The user will have the specified access to the VPN.
   - If the user is going to do Tunnel mode, using function **svc-enabled** or **svc-required** in the group policy or RADIUS attributes, the process to push down the SSL VPN Client will happen next. This will mean that the SSL VPN Client once installed on the client PC will establish a new SSL session to the context, and the original context will be removed.

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

Furthermore, it will alter the PC routing table to do the specified tunnel function defined in the policy.

5. Now that the user session is established to the SSL VPN secure gateway, the backend interfaces handle the access to the inside network.

Once a user is authenticated under a given context, the user session is established. This user session will embody the parameters specified globally in the context, the group policy, and any RADIUS attributes pushed down during authentication for that user.

Note: RADIUS attributes pushed from the AAA server for a user session will override the equivalent configured values. This allows the group policy to apply the entire default configuration for a group of users, and the RADIUS attributes will fine-tune the user session.

6.2 SSL VPN Clientless Mode Portal

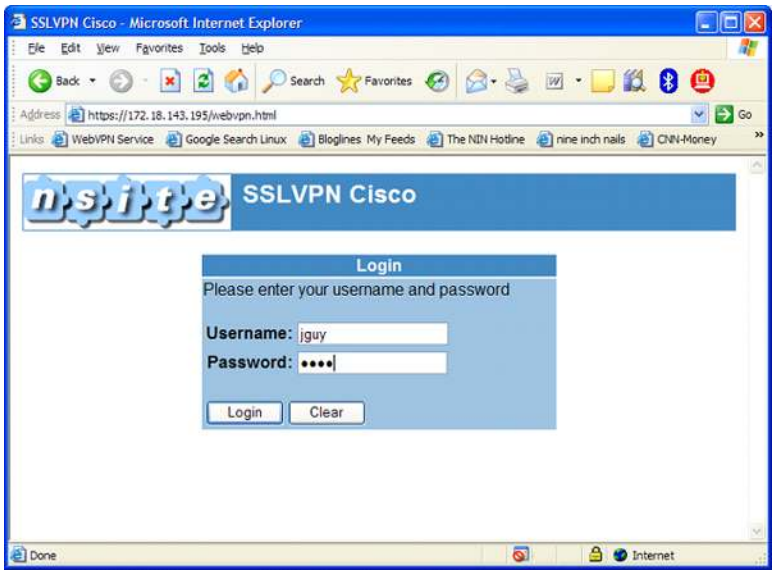
In Clientless mode, the SSL VPN tunnel endpoint exists in the Web browser used to establish the SSL VPN connection. Once a user logs in, and is authenticated by a specific context, the user is now attached to the SSL VPN. This means the user session in the context has the policy applied, and any RADIUS attributes. Furthermore, if the context is in a VRF, the user session is also in that VRF.

The SSL VPN portal is the VPN interface used to access the resources located inside the VPN. This is where the configuration of the policy group, and other settings inside the context, really enhance the user experience. These provide the user links and controls to work inside the VPN through a Web browser. The user can access any Web-based application through the portal if the service is available (citrix, exchange, call manager, etc.). If a user needs more than Web-based applications, they can ask the provider for thin-client or port-forwarding mode.

6.2.1 SSL VPN Login

Figure 4 shows the SSL VPN login page for VPN1.

Figure 4. SSL VPN Login Screen



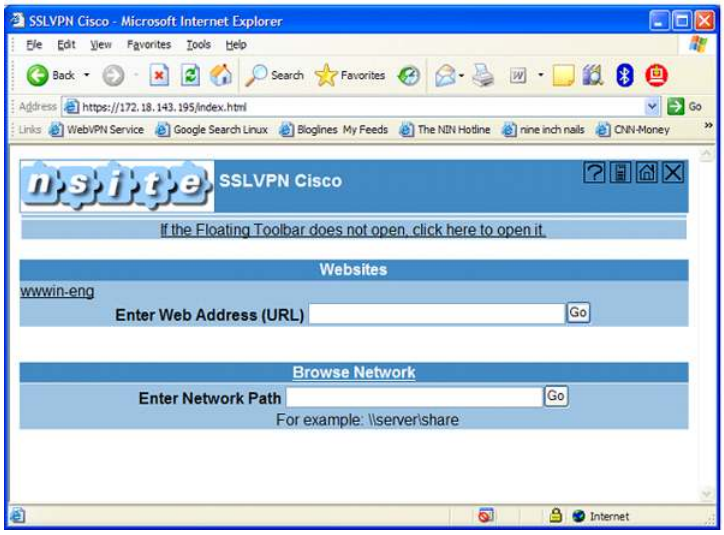
6.2.2 SSL VPN Clientless Portal

After authentication has completed, the user is mapped into the policy group containing any session-level settings to be applied to the user session. This includes the settings for URL lists,

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

CIFS, Citrix, and other session parameters. Figure 5 shows the clientless portal after the user is authenticated.

Figure 5. SSL VPN Portal



6.3 SSL VPN Tunnel Mode and SSL VPN Client

In Tunnel mode, the SSL VPN tunnel endpoint on the client PC is the SSL VPN Client. Once a user logs in, and is authenticated by a specific context, the SSL VPN Client is pushed down to the client PC over the SSL connection, and installed. Once this is successfully installed, the SSL VPN Client creates a new SSL connection for the tunnel, and alters the routing table on the PC. The user is now attached via the SSL VPN tunnel. If the context is in a VRF, the user tunnel is also in that VRF.

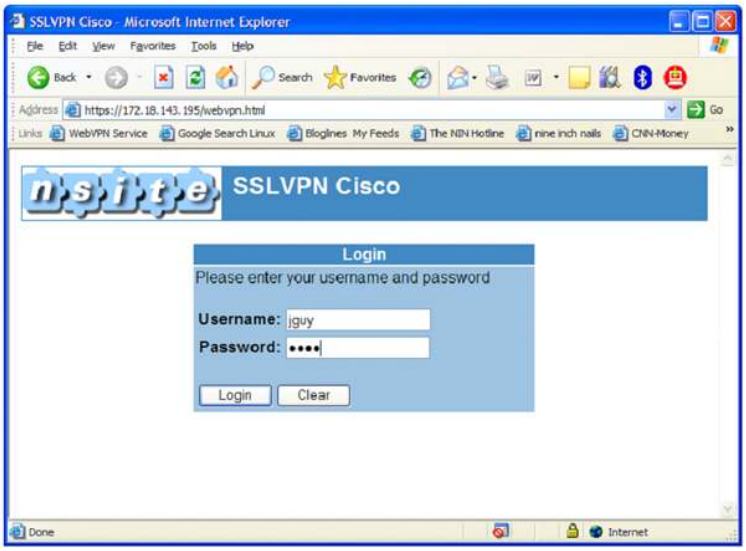
The SSL VPN Client creates a virtual adapter in the user's PC. This is the tunnel interface for the SSL VPN tunnel. So, the full tunnel mode allows a user to attach the entire machine to the VPN. There is no extra software installed, or needed for the tunnel mode deployment.

6.3.1 SSL VPN Login

Figure 6 shows the SSL VPN login page for VPN1. This is identical to the login screen seen in figure 4.

Figure 6. SSL VPN Login Screen

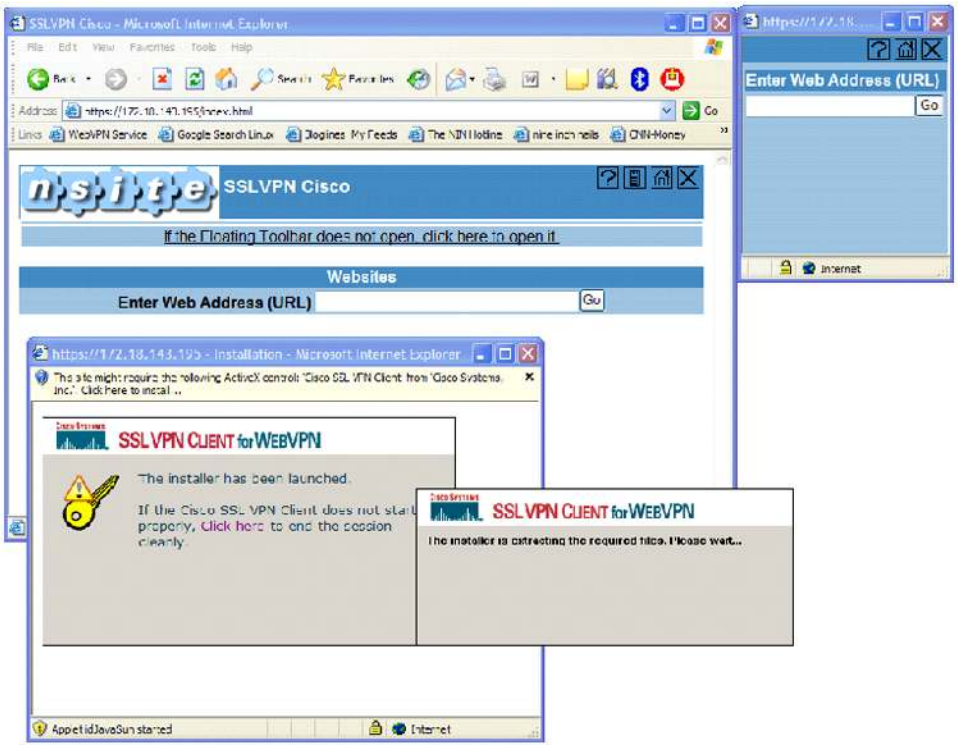
All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.



6.3.2 SSL VPN Tunnel Initiation

After authentication has completed, and the user is mapped into the policy group containing the *svc-enabled* command, the SSL VPN Client will begin to push down to the client PC; however, the clientless portal is also available if that fails, and you can see that it is in the background in Figure 7.

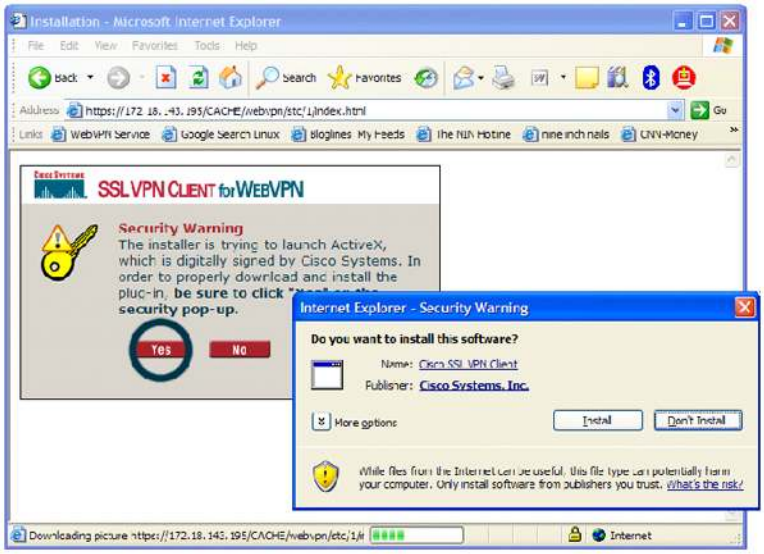
Figure 7. SSL VPN Clientless Portal and SSL VPN Client Installer



If the policy group specifies *svc-required*, you will not see a clientless portal, and the session goes immediately to SSL VPN Client download (Figure 8).

Figure 8. SSL VPN Client Installer

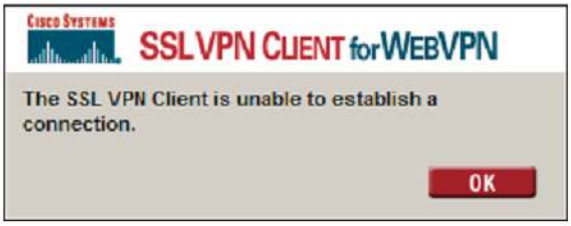
All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.



The SSL VPN Client download is done in various ways. It will try ActiveX on windows machines, causing the ActiveX warning. If you do not accept it, or ActiveX is denied, the Java installer will attempt to install the SSL VPN Client. Once the method of downloading the SSL VPN Client is determined, you will see other windows in certain circumstances. If it cannot initiate the download with one of the methods, it will display an error. See Section 6.3.3 for more details.

6.3.3 SSL VPN Client Install Error

Figure 9. SSL VPN Client Download Error

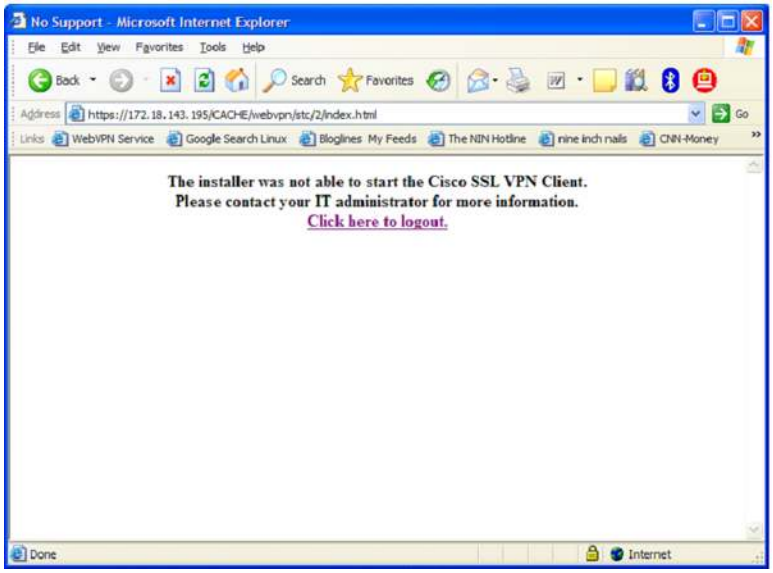


In some cases, the SSL VPN Client download fails. Typically, if everything is set up correctly, this will only happen if the user declines the SSL VPN Client download or the certificate. The window shown in Figure 9 will display, and the user will need to reinitiate the session.

However, if for some reason the installer is the problem, and cannot download the SSL VPN Client due to not allowing the ActiveX, a Java problem, or other related issue, the screen in Figure 10 will be displayed.

Figure 10. SSL VPN Client Installer Error

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.



6.3.4 SSL VPN Client Certificate Authentication

In some cases, you will need to manually authenticate the certificate the secure gateway sends the client PC. This occurs when the client PC finds a discrepancy in the certificate, typically due to the URL used to contact the secure gateway being different from the 'DNS Name' or 'Name' field in the certificate. It is important to view the certificate, and verify it is trustworthy (Figures 11–13). Close the certificate and manually accept the certificate.

Figure 11. Certificate Error Detected

Figure 12. Certificate View

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

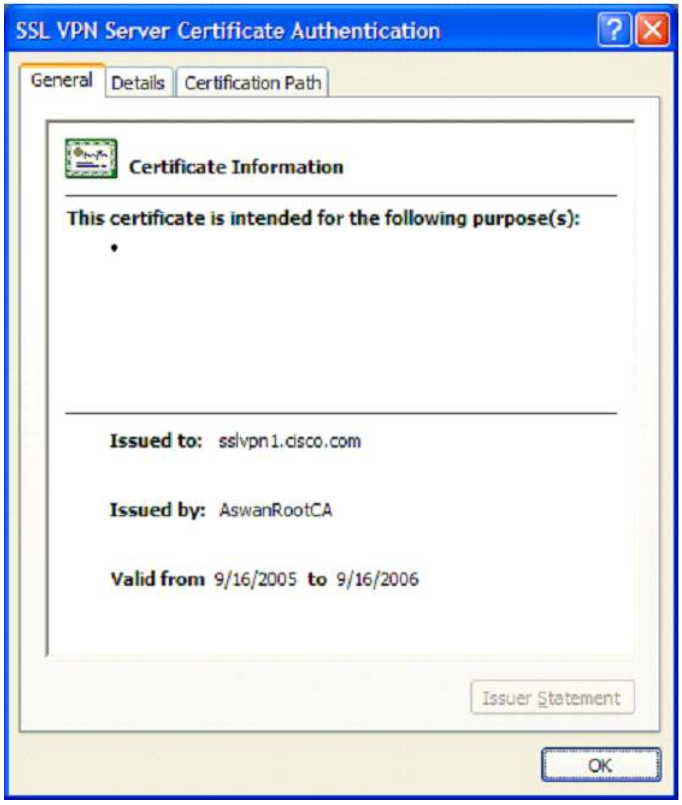


Figure 13. Manual Certificate Authentication

This problem can easily be solved by doing the following:

- Use the DNS name for the WebVPN gateway in the HTTPS://<gateway>/<domain> URL.
- Ensure the trustpoint is enrolled with the DNS name for the gateway. It is best to have a trustpoint per WebVPN gateway. By doing so, the gateway address will have a DNS name, and that can be specified while enrolling the trustpoint to a known CA, which creates the proper certificate.
- The client PC MUST have that CA's root certificate, so it can verify automatically that the downloaded certificate is good.

6.3.5 SSL VPN Client Enable Local LAN

Figure 14. SSL VPN Client Local LAN Access

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

If the policy group is set up for split tunneling and excluding local LAN, a message will pop up asking the user if they want to enable access to the local LAN (Figure 14). This will impact the client PC routing table, as described in Section 6.2.2 of this document.

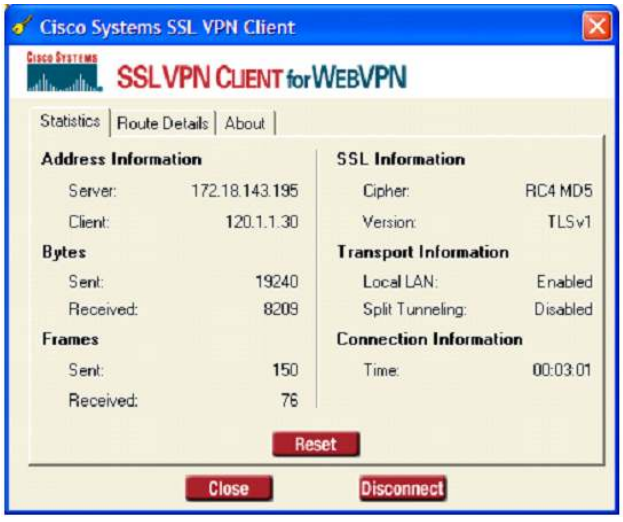
6.3.6 SSL VPN Client Installed

Figure 15. SSL VPN Client Icon

As soon as the certificate passes authentication, the tunnel will be established. This means the SSL VPN tunnel is active, and you will see a key icon in the toolbar of a windows machine (Figure 15).

By double-clicking on this icon, you can open the SSL VPN Client window, and see the client side information for the tunnel.

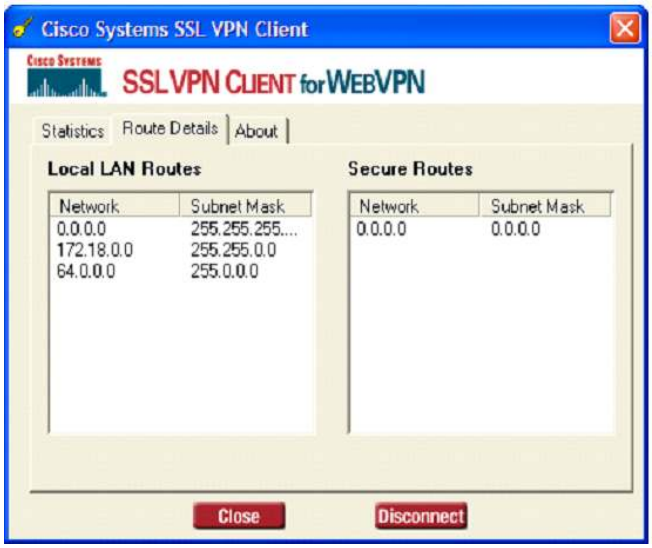
Figure 16. SSL VPN Client Statistics Tab



The Statistics tab lists the SSL VPN Client address allocated from the IP local pool (Figure 16). It also indicates the traffic stats, encryption information, transport setup, and connection time.

Figure 17. SSL VPN Client Route Details Tab

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.



The Route Details tab shows the routing the SSL VPN Client is using. It lists the secure routes, and which of those routes are included on the SSL VPN tunnel. The local LAN routes are excluded from the SSL VPN tunnel and routed out over the local LAN connection.

In the About tab, you can see the version of the SSL VPN Client (Figure 18).

Figure 18. SSL VPN Client About Tab

7. SSL VPN Verification and Debugging

This section covers the operation of the WebVPN gateway and context. It includes some basic debugging of the configuration but does not go into troubleshooting. The complete configuration can be seen in the appendices. We will be focusing on WebVPN context **vpn1** for some of the context-specific operations.

Note: All the output below is from Cisco IOS Software Release 12.4(9)T.

7.1 WebVPN Gateway

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

```
sslvpn1#show webvpn gateway

Gateway Name                        Admin  Operation
------------                        -----  ---------
ssl-gw1                             up     up
ssl-gw2                             up     up

sslvpn1#show webvpn gateway ssl-gw1
Admin Status: up
Operation Status: up
IP: 172.18.143.195, port: 443
SSL Trustpoint: win2k3
```

7.2 WebVPN Context

The command **show webvpn context** will display a table of the context names. Included for each context is the associated gateway, domain, and VRF. It will also show the status of the context, Admin Status (AS), and Operational Status (OS).

```
sslvpn1#show webvpn context

Codes: AS - Admin Status, OS - Operation Status
       VHost - Virtual Host

Context Name        Gateway  Domain/VHost      VRF      AS    OS
------------        -------  ------------      -------  ----  --------
vpn1                ssl-gw1  cisco             -        up    up
vpn2                ssl-gw1  linksys           -        up    up
```

The detailed output of the context is shown below.

```
sslvpn1#show webvpn context vpn1
Admin Status: up
Operation Status: up
CSD Status: Disabled
Certificate authentication type: All attributes (like CRL) are
verified
AAA Authentication List: ssl_global
AAA Authentication Domain: @cisco
Default Group Policy: aswan
Associated WebVPN Gateway: ssl-gw1
Domain Name: cisco
Maximum Users Allowed: 1000 (default)
NAT Address not configured
VRF Name not configured

sslvpn1#show webvpn context vpn2
Admin Status: up
Operation Status: up
```

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

```
CSD Status: Disabled
Certificate authentication type: All attributes (like CRL) are
verified
AAA Authentication List: ssl_global
AAA Authentication Domain: @linksys
Default Group Policy: vpn2
Associated WebVPN Gateway: ssl-gw1
Domain Name: linksys
Maximum Users Allowed: 1000 (default)
NAT Address not configured
VRF Name not configured
```

7.3 WebVPN Context Problems

The command **show webvpn context** is similar to **show ip interface brief**.

If the context is not **inservice**, AS and OS will be listed as down.

```
sslvpn1#show webvpn context

Codes: AS - Admin Status, OS - Operation Status
       VHost - Virtual Host

Context Name        Gateway  Domain/VHost      VRF      AS    OS
------------        -------  ------------      -------  ----  --------
vpn1                ssl-gw1  cisco             -        down  down
vpn2                ssl-gw1  linksys           -        up    up

sslvpn1#show webvpn context vpn1
Admin Status: down
Operation Status: down
CSD Status: Disabled
Certificate authentication type: All attributes (like CRL) are
verified
AAA Authentication List: ssl_global
AAA Authentication Domain: @cisco
Default Group Policy: aswan
Associated WebVPN Gateway: ssl-gw1
Domain Name: cisco
Maximum Users Allowed: 1000 (default)
NAT Address not configured
VRF Name not configured
```

If the **webvpn gateway** is not configured under the context, the OS will be down.

```
sslvpn1#show webvpn context

Codes: AS - Admin Status, OS - Operation Status
       VHost - Virtual Host
```

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

```
Context Name        Gateway  Domain/VHost      VRF      AS    OS
------------        -------  ------------      -------  ----  --------
vpn1                -        -                 -
       up    down (no gateway)
vpn2                ssl-gw1  linksys           -        up    up

sslvpn1#show webvpn context vpn1
Admin Status: up
Operation Status: down
CSD Status: Disabled
Down Reason: no gateway
Certificate authentication type: All attributes (like CRL) are
verified
AAA Authentication List: ssl_global
AAA Authentication Domain: @cisco
Default Group Policy: aswan
Not associated with any WebVPN Gateway
Domain Name and Virtual Host not configured
Maximum Users Allowed: 1000 (default)
NAT Address not configured
VRF Name not configured
```

There are times when a context can get into a “bad” state. The output will look like the following example; the configs can be fine, but the context will not work. The way to fix this is to remove the context and reconfigure it.

```
sslvpn1#show webvpn context

Codes: AS - Admin Status, OS - Operation Status
       VHost - Virtual Host

Context Name        Gateway  Domain/VHost    VRF      AS    OS
------------        -------  ------------    -------  ----  --------
vpn1                ssl-gw1  cisco           -
       up    down (cfg update failed)
vpn2                ssl-gw1  linksys         -        up    up

sslvpn1#show webvpn context vpn1
Admin Status: up
Operation Status: down
CSD Status: Disabled
Down Reason: cfg update failed
Certificate authentication type: All attributes (like CRL) are
verified
AAA Authentication List: ssl_global
AAA Authentication Domain: @cisco
Default Group Policy: aswan
Associated WebVPN Gateway: ssl-gw1
Domain Name: cisco
Maximum Users Allowed: 1000 (default)
```

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

```
NAT Address not configured
VRF Name not configured
```

8. Limitations, Caveats, Integration Issues, and Guidelines

- None.

9. Related Documents

- Cisco IOS SSL VPN page: http://www.cisco.com/go/iossslvpn
- Data sheet: http://www.cisco.com/en/US/products/ps6635/products_data_sheet0900aecd80405e25.html
- Configuration guide: http://www.cisco.com/en/US/products/ps6441/products_feature_guide09186a00805eeaea.html

10. Acknowledgements

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (http://www.openssl.org/)

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

Appendix A—SSL VPN RADIUS Attribute-Value Pairs

Note: All SSL VPN attributes (except for the standard IETF RADIUS attributes) start with **webvpn**.

For example:

- webvpn:urllist-name=cisco
- webvpn:nbnslist-name=cifs
- webvpn:default-domain=cisco.com

Attribute	Type of Value	Values	Default
addr (Framed-IP-Address)[1]	ipaddr	IP_address	
addr-pool	string	name	
banner	string		
default-domain	string		
dns-servers	ipaddr	IP_address	
dpd-client-timeout	integer (seconds)	0 (disabled)-3600	300
dpd-gateway-timeout	integer (seconds)	0 (disabled)-3600	300
file-access	integer	0 (disable) 1 (enable)[2]	0
file-browse	integer	0 (disable) 1 (enable)[2]	0
file-entry	integer	0 (disable) 1 (enable)[2]	0
hide-urlbar	integer	0 (disable) 1 (enable)[2]	0
home-page	string		
idletime (Idle-Timeout)[1]	integer (seconds)	0-3600	2100
ie-proxy-exception	string	DNS_name	
	ipaddr	IP_address	
ie-proxy-server	ipaddr	IP_address	
inacl	integer	1-199, 1300-2699	
	string	name	
keep-svc-installed	integer	0 (disable) 1 (enable)[2]	1
nbnslist-name	string	name	
netmask (Framed-IP-Netmask)[1]	ipaddr	IP_address_mask	
port-forward-name	string	name	
primary-dns	ipaddr	IP_address	
rekey-interval	integer (seconds)	0-43200	3600
secondary-dns	ipaddr	IP_address	
split-dns	string		
split-exclude[3]	ipaddr ipaddr	IP_address IP_address_mask	

[1] Standard IETF RADIUS attributes.
[2] Any integer other than 0 enables this feature.
[3] You can specify either split-include or split-exclude, but you cannot specify both options.

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

Attribute	Type of Value	Values	Default
	word	local-lans	
split-include[3]	ipaddr ipaddr	IP_address IP_address_mask	
svc-enabled[4]	integer	0 (disable) 1 (enable)[2]	0
svc-ie-proxy-policy	word	none, auto, bypass-local	
svc-required[4]	integer	0 (disable) 1 (enable)[2]	0
timeout (Session-Timeout)[1]	integer (seconds)	1-1209600	43200
urllist-name	string	name	
user-vpn-group	string	name	
wins-server-primary	ipaddr	IP_address	
wins-servers	ipaddr	IP_address	
wins-server-secondary	ipaddr	IP_address	

[4] You can specify either svc-enable or svc-required, but you cannot specify both options.

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

Appendix B—PKI Setup

This is a brief overview of setting up the PKI for the WebVPN module. The samples are from the NSITE testbed, but the information comes directly from Cisco.com. For a detailed explanation, go to:
http://www.cisco.com/en/US/products/hw/switches/ps708/products_configuration_guide_chapter09186a008048e659.html#wp1343184

Generating RSA Keys

The RSA algorithm is widely used by certificate authorities and SSL servers to generate key pairs. Each certificate authority and each SSL server has its own RSA key pair. The SSL server sends its public key to the certificate authority when enrolling for a certificate. The SSL server uses the certificate to prove its identity to clients when setting up the SSL session. This should be done prior to defining the PKI trustpoint.

The SSL server keeps the private key in a secure storage, and sends only the public key to the certificate authority, which uses its private key to sign the certificate that contains the server's public key and other identifying information about the server. Each certificate authority keeps the private key secret and uses the private key to sign certificates for its subordinate certificate authorities and SSL servers. The certificate authority has a certificate that contains its public key.

The example below shows the creation of a 2048-bit RSA key named **win2k3**, which is exportable.

```
sslvpn1(config)#crypto key generate rsa general-keys label win2k3 mod
2048 export
The name for the keys will be: win2k3

% The key modulus size is 2048 bits
% Generating 2048 bit RSA keys ...[OK]

sslvpn1(config)#
```

Note: For more information regarding RSA key generation for WebVPN, go to:
http://www.cisco.com/en/US/products/hw/switches/ps708/products_configuration_guide_chapter09186a008048e659.html#wp1343354

Configuring the Trustpoint

After you have generated the RSA keys, you configure the trustpoint.

```
crypto pki trustpoint win2k3
 enrollment mode ra
 enrollment url http://nsite-ipsec5:80/certsrv/mscep/mscep.dll
 serial-number
 fqdn sslvpn1.cisco.com
 revocation-check crl
 rsakeypair win2k3
!
```

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

Certificate Authority Authentication and Enrollment

Now you have to authenticate the trustpoint to the CA server. This basically means you are obtaining the certificate that contains the public key of the certificate authority.

```
sslvpn1(config)#crypto pki authenticate win2k3
Certificate has the following attributes:
     Fingerprint MD5: 7B28965A 7C5BA601 6C04672E 362B34C3
     Fingerprint SHA1: 22E22E7F 3EB567FB F2C5790E 03FA2A81 C5AC1DA5

% Do you accept this certificate? [yes/no]: yes
Trustpoint CA certificate accepted.
sslvpn1(config)#
```

Once the trustpoint is authenticated, it must be enrolled. When you enroll your trustpoint, you obtain a signed certificate from the certificate authority for your trustpoint. This has to be done for every trustpoint.

```
sslvpn1(config)#crypto pki enroll win2k3
%
% Start certificate enrollment ..
% Create a challenge password. You will need to verbally provide this
   password to the CA Administrator in order to revoke your
certificate.
   For security reasons your password will not be saved in the
configuration.
   Please make a note of it.
Password:
Re-enter password:
% The subject name in the certificate will include: sslvpn1.cisco.com
% The serial number in the certificate will be: 30461873
% Include an IP address in the subject name? [no]:
Request certificate from CA? [yes/no]: yes
% Certificate request sent to Certificate Authority
% The 'show crypto ca certificate win2k3 verbose' command will show
the fingerprint.
01:01:46: CRYPTO_PKI:  Certificate Request Fingerprint MD5: 4551765D
3C39F0AA
A4A62937 FACFB9D7
01:01:46: CRYPTO_PKI:  Certificate Request Fingerprint SHA1: 58DC8B50
4F4AB33D
DE00AD8E 29B7B0A5 FE628812
01:01:49: %PKI-6-CERTRET: Certificate received from Certificate
Authority
sslvpn1(config)#
```

Note: For more information on obtaining the certificate authority certificate, go to: http://www.cisco.com/en/US/products/hw/switches/ps708/products_configuration_guide_chapter09186a008048e659.html#wp1343535

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

Certificate Verification

To verify the certificate is correctly installed on the router, use the command **show crypto pki certificates** to display the certificate fields.

```
sslvpn1#sh crypto pki certificates
Certificate
  Status: Available
  Certificate Serial Number: 6165612F000000000005
  Certificate Usage: General Purpose
  Issuer:
    cn=AswanRootCA
  Subject:
    Name: sslvpn1.cisco.com
    Serial Number: B0FFF15D
    hostname=sslvpn1.cisco.com
    serialNumber=B0FFF15D
  CRL Distribution Points:
    http://nsite-ipsec5/CertEnroll/AswanRootCA.crl
  Validity Date:
    start date: 09:30:17 EDT Sep 16 2005
    end   date: 09:40:17 EDT Sep 16 2006
  Associated Trustpoints: win2k3

CA Certificate
  Status: Available
  Certificate Serial Number: 18D72EA3CA8438B7423E4553363F9E85
  Certificate Usage: Signature
  Issuer:
    cn=AswanRootCA
  Subject:
    cn=AswanRootCA
  CRL Distribution Points:
    http://nsite-ipsec5/CertEnroll/AswanRootCA.crl
  Validity Date:
    start date: 08:50:22 EDT Sep 7 2005
    end   date: 08:57:12 EDT Sep 7 2010
  Associated Trustpoints: win2k3
```

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

Appendix C—Cisco IOS SSL VPN Configuration

```
version 12.4
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname VXR-SSL-AGG
!
enable password lab
!
aaa new-model
!
aaa group server radius ACS
 server-private 217.1.1.1 auth-port 1645 acct-port 1646 key cisco123
 ip vrf forwarding vpn1
 ip radius source-interface GigabitEthernet0/0.501
!
aaa group server radius AR
 server-private 100.1.1.2 auth-port 1645 acct-port 1646 key cisco123
 ip radius source-interface Ethernet0/0
!
aaa authentication login ssl_ent group ACS
aaa authentication login ssl_global group AR
!
aaa session-id common
!
ip subnet-zero
!
ip cef
ip domain name cisco.com
ip name-server 172.18.138.14
!
crypto pki trustpoint win2k3
 enrollment mode ra
 enrollment url http://nsite-ipsec5:80/certsrv/mscep/mscep.dll
 serial-number
 fqdn VXR-SSL-AGG.cisco.com
 revocation-check crl
 rsakeypair rsakey
!
!
crypto pki certificate chain win2k3
 certificate 12DF1640000000000009
 certificate ca 18D72EA3CA8438B7423E4553363F9E85
!
username lab password 0 lab
username labuser@cisco password 0 labuser
!
interface Ethernet0/0
```

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

```
 description management to 7600-3:f3/7
 ip address 100.1.1.220 255.255.255.0
 duplex auto
 ntp broadcast client
!
interface GigabitEthernet0/0
 description to 7600-3:g8/3
 no ip address
 duplex full
 speed 1000
 media-type gbic
 no negotiation auto
!
interface GigabitEthernet0/0.143
 description Connection to Lab BB
 encapsulation dot1Q 143
 ip address 172.18.143.194 255.255.255.0
 no snmp trap link-status
!
interface GigabitEthernet0/0.501
 encapsulation dot1Q 501
 ip address 120.1.1.250 255.255.255.0
 no snmp trap link-status
!
interface GigabitEthernet0/0.502
 encapsulation dot1Q 502
 ip address 120.1.2.250 255.255.255.0
 no snmp trap link-status
!
ip classless
!
ip local pool ssl_addr_pool2 120.1.2.200 120.1.2.210 group vpn2
!
ip route 0.0.0.0 0.0.0.0 172.18.143.1
!
line con 0
 exec-timeout 0 0
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
 password lab
!
ntp clock-period 17179864
!
webvpn gateway ssl-gw1
 ip address 172.18.143.193 port 443
 ssl trustpoint win2k3
 inservice
```

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

```
 !
webvpn install svc disk0:/webvpn/svc.pkg
webvpn install csd disk0:/webvpn/sdesktop.pkg
 !
webvpn context vpn1
title "SSLVPN Cisco"
 logo file disk0:/nsitelogo.gif
 title-color #4186BE
 secondary-color #9ABEDC
 ssl authenticate verify all
 !
 url-list "nsite"
   heading "NSITE Links"
   url-text "NSITE" url-value "http://nsite.cisco.com"
   url-text "ASWAN" url-
value "http://nsite/groups/ST5/content/aswan/aswan-main.htm"
 !
 url-list "eng"
   url-text "wwwin-eng" url-value "http://wwwin-eng.cisco.com"
 !
 policy group vpn1
   url-list "eng"
 !
 policy group aswan
   url-list "nsite"
 !
 default-group-policy aswan
 aaa authentication list ssl_global
 aaa authentication domain @cisco
 gateway ssl-gw1 domain cisco
 inservice
!
webvpn context vpn2
 title "Linksys SSLVPN"
 title-color #601080
 secondary-color #E1A0FF
 ssl authenticate verify all
 !
 policy group vpn2
   functions svc-required
   svc address-pool "ssl_addr_pool2"
   svc split exclude local-lans
   svc split exclude 172.18.0.0 255.255.0.0
 !
 default-group-policy vpn2tunnel
 aaa authentication list ssl_global
 aaa authentication domain @linksys
 gateway ssl-gw1 domain linksys
 inservice
!
```

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.

end

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV
Amsterdam, The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

CCDE, CCVP, Cisco Eos, Cisco StadiumVision, the Cisco logo, DCE, and Welcome to the Human Network are trademarks; Changing the Way We Work, Live, Play, and Learn is a service mark; and Access Registrar, Aironet, AsyncOS, Bringing the Meeting To You, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, CCSP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Collaboration Without Limitation, Enterprise/Solver, EtherChannel, EtherFast, EtherSwitch, Event Center, Fast Step, Follow Me Browsing, FormShare, GigaDrive, HomeLink, Internet Quotient, IOS, iPhone, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, iQuick Study, IronPort, the IronPort logo, LightStream, Linksys, MediaTone, MeetingPlace, MGX, Networkers, Networking Academy, Network Registrar, PCNow, PIX, PowerPanels, ProConnect, ScriptShare, SenderBase, SMARTnet, Spectrum Expert, StackWise, The Fastest Way to Increase Your Internet Quotient, TransPath, WebEx, and the WebEx logo are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or Website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0801R)

Printed in USA C11-362468-01 02/08

All contents are Copyright © 1992–2007 Cisco Systems, Inc. All rights reserved. This document is Cisco Public Information.