SSL VPN Configuration Guide for Cisco Cloud Services Router 1000V Series, Cisco IOS XE Everest 16.6

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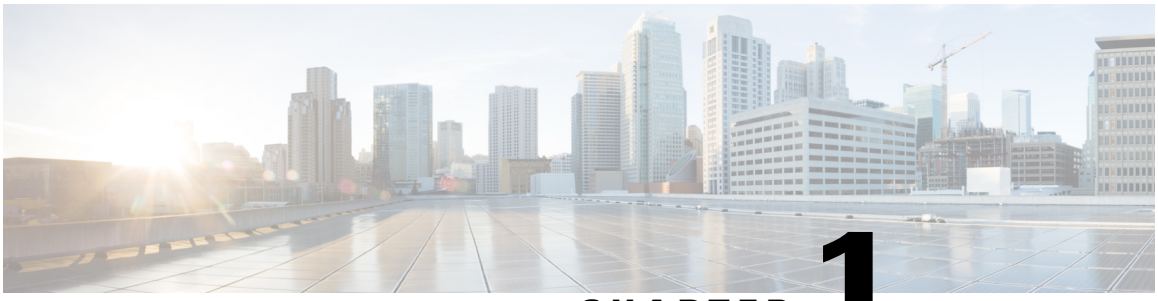


CHAPTER 1

Read Me First

Important Information about Cisco IOS XE 16

Effective Cisco IOS XE Release 3.7.0E (for Catalyst Switching) and Cisco IOS XE Release 3.17S (for Access and Edge Routing) the two releases evolve (merge) into a single version of converged release—the Cisco IOS XE 16—providing one release covering the extensive range of access and edge products in the Switching and Routing portfolio.

Feature Information

Use Cisco Feature Navigator to find information about feature support, platform support, and Cisco software image support. An account on Cisco.com is not required.

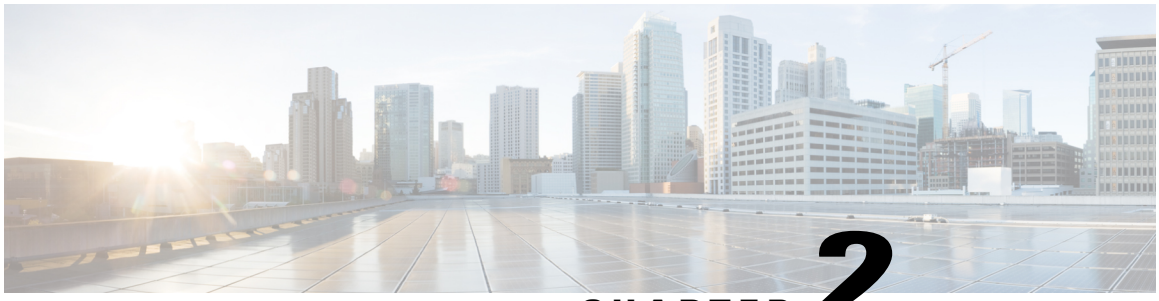
Related References

- Cisco IOS Command References, All Releases

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see What's New in Cisco Product Documentation.

To receive new and revised Cisco technical content directly to your desktop, you can subscribe to the What's New in Cisco Product Documentation RSS feed. RSS feeds are a free service.



CHAPTER 2

SSL VPN

SSL VPN provides support in the Cisco IOS software for remote user access to enterprise networks from anywhere on the Internet. Remote access is provided through a Secure Socket Layer (SSL)-enabled SSL VPN gateway. The SSL VPN gateway allows remote users to establish a secure VPN tunnel. The XE SSL VPN Support feature provides a comprehensive solution that allows easy access to a broad range of web resources and web-enabled applications using native HTTP over SSL (HTTPS) browser support through the full-tunnel client support.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for SSL VPN

To securely access resources on a private network behind an SSL VPN gateway, the remote user of an SSL VPN service must have the following:

- An account (login name and password).
- Support for full tunnel mode using Cisco AnyConnect Client.
- Operating system support. For more information, see the "AnyConnect Secure Mobility Client 3.1 Computer OSs Supported" section in the *Supported VPN Platforms, Cisco ASA 5500 Series* document.
- Administrative privileges to install Cisco AnyConnect client.

Note This feature is supported on the Cisco CSR 1000V Series Cloud Services Router only.

Restrictions for SSL VPN

- ACL's do not support DENY statements.

Information About SSL VPN

SSL VPN Overview

Cisco IOS SSL VPN is a router-based solution offering Secure Sockets Layer (SSL) VPN remote-access connectivity integrated with industry-leading security and routing features on a converged data, voice, and wireless platform. The security is transparent to the end user and easy to administer. With Cisco IOS SSL VPN, end users gain access securely from home or any Internet-enabled location such as wireless hotspots. Cisco IOS SSL VPN also enables companies to extend corporate network access to offshore partners and consultants, keeping corporate data protected all the while. Cisco IOS SSL VPN in conjunction with the dynamically downloaded Cisco AnyConnect VPN Client provides remote users with full network access to virtually any corporate application.

SSL VPN delivers the following three modes of SSL VPN access, of which only tunnel mode is supported in Cisco IOS XE software:

- Clientless—Clientless mode provides secure access to private web resources and will provide access to web content. This mode is useful for accessing most content that you would expect to access in a web browser, such as Internet access, databases, and online tools that employ a web interface.
- Thin Client (port-forwarding Java applet)—Thin client mode extends the capability of the cryptographic functions of the web browser to enable remote access to TCP-based applications such as Post Office Protocol version 3 (POP3), Simple Mail Transfer Protocol (SMTP), Internet Message Access protocol (IMAP), Telnet, and Secure Shell (SSH).
- Tunnel Mode—Full tunnel client mode offers extensive application support through its dynamically downloaded Cisco AnyConnect VPN Client (next-generation SSL VPN Client) for SSL VPN. Full tunnel client mode delivers a lightweight, centrally configured and easy-to-support SSL VPN tunneling client that provides network layer access to virtually any application.

Note SSL VPN will not work if ip http secure-server is enabled.

Modes of Remote Access

Tunnel Mode

In a typical clientless remote access scenario, remote users establish an SSL tunnel to move data to and from the internal networks at the application layer (for example, web and e-mail). In tunnel mode, remote users use an SSL tunnel to move data at the network (IP) layer. Therefore, tunnel mode supports most IP-based applications. Tunnel mode supports many popular corporate applications (for example, Microsoft Outlook, Microsoft Exchange, Lotus Notes E-mail, and Telnet).

SSL VPN support provided by full tunnel mode is as follows:

- Works like “clientless” IPsec VPN
- Tunnel client loaded through Java or ActiveX
- Application agnostic—supports all IP-based applications
- Scalable
- Local administrative permissions required for installation

Full tunnel client mode offers extensive application support through its dynamically downloaded Cisco AnyConnect VPN Client (next-generation SSL VPN Client) for SSL VPN. Full tunnel client mode delivers a lightweight, centrally configured and easy-to-support SSL VPN tunneling client that provides network layer access to virtually any application. The advantage of SSL VPN comes from its accessibility from almost any Internet-connected system without needing to install additional desktop software. Cisco SSL AnyConnect VPN allows remote users to access enterprise networks on the Internet through an SSL VPN gateway. During the establishment of the SSL VPN with the gateway, the Cisco AnyConnect VPN Client is downloaded and installed on the remote user equipment (laptop, mobile, PDA, etc.), and the tunnel connection is established when the remote user logs into the SSL VPN gateway. The tunnel connection is determined by the group policy configuration. By default, the Cisco AnyConnect VPN Client is removed from the client PC after the connection is closed. However, you have the option to keep the Cisco AnyConnect VPN Client installed on the client equipment.

Cisco SSL AnyConnect VPN easy access to services within the company’s network and simplifies the VPN configuration on the SSL VPN gateway, reducing the overhead for system administrators.

SSL VPN CLI Constructs

SSL Proposal

SSL proposal specifies the cipher suites that are supported. Each cipher suite defines a key exchange algorithm, a bulk encryption algorithm, a MAC algorithm. One of the cipher suites configured would be chosen from

the client's proposal during SSL negotiation. If the intersection between the client proposed suites and configured suites is a null set, the negotiation terminates. Ciphers are currently selected based on the client's priority.

The SSL proposal is used in SSL handshake protocol for negotiating encryption and decryption. The default SSL proposal is used with SSL policy in the absence of any user-defined proposal. The default proposal has ciphers in the order as show below:

```
protection rsa-aes256-sha1 rsa-aes128-sha1 rsa-3des-ede-sha1 rsa-3des-ede-sha1
```

SSL Policy

SSL policy defines the cipher suites to be supported and the trust point to be used during SSL negotiation. SSL policy is a container of all the parameters used in the SSL negotiation. The policy selection would be done by matching the session parameters against the parameters configured under the policy. There is no default policy. Every policy is associated with a proposal and a trustpoint.

SSL Profile

The SSL VPN profile defines authentication and accounting lists. Profile selection depends on policy and URL values. Profile may, optionally, be associated with a default authorization policy.

The following rules apply:

- The policy and URL must be unique for an SSL VPN profile.
- At least one authorization method must be specified to bring up the session.
- The three authorization types namely user, group and cached may coexist.
- There is no default authorization.
- The order of precedence for authorization is user authorization, cache authorization, and group authorization. If group authorization override is configured the order of precedence is group authorization, user authorization, and cache authorization.

SSL Authorization Policy

The SSL authorization policy is a container of authorization parameters that are pushed to the remote client and are applied either locally on the virtual-access interface or globally on the device. The authorization policy is referred from the SSL VPN profile.

SSL VPN MIB

The SSL VPN MIB represents the Cisco implementation-specific attributes of a Cisco entity that implements SSL VPN. The MIB provides operational information in Cisco’s SSL VPN implementation by managing the SSLVPN, trap control, and notification groups. For example, the SSL VPN MIB provides the number of active SSL tunnels on the device.

How to Configure SSL VPN

Configuring SSL Proposal

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **crypto ssl proposal** *proposal-name*
4. **protection**
5. **end**
6. **show crypto ssl proposal** [*proposal name*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**crypto ssl proposal** *proposal-name* **Example:** `Device(config)# crypto ssl proposal proposal1`	Defines an SSL proposal name, and enters crypto SSL proposal configuration mode.
Step 4	**protection** **Example:** `Device(config-crypto-ssl-proposal)# protection rsa-3des-ede-sha1 rsa-aes128-sha1`	Specifies one or more cipher suites that are as follows: • rsa-3des-ede-sha1 • rsa-aes128-sha1 • rsa-aes256-sha1 • rsa-rc4128-md5
Step 5	**end** **Example:** `Device(config-crypto-ssl-proposal)# end`	Exits SSL proposal configuration mode and returns to privileged EXEC mode.

	Command or Action	Purpose
Step 6	**show crypto ssl proposal** [*proposal name*] **Example:** `Device# show crypto ssl proposal`	(Optional) Displays the SSL proposal.

What to Do Next

After configuring the SSL proposal, configure the SSL policy. For more information, see the "Configuring SSL Policy" section.

Note SSL VPN will not work if ip http secure-server is enabled.

Configuring SSL Policy

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **crypto ssl policy** *policy-name*
4. **ip address local** *ip-address* [**vrf** *vrf-name*] [**port** *port-number*] [**standby** *redundancy-name*]
5. **ip interface local** *interface-name* [**vrf** *vrf-name*] [**port** *port-number*] [**standby** *redundancy-name*]
6. **pki trustpoint** *trustpoint-name* **sign**
7. **ssl proposal** *proposal-name*
8. **no shut**
9. **end**
10. **show crypto ssl policy** [*policy-name*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**crypto ssl policy** *policy-name* **Example:** `Device(config)# crypto ssl policy policy1`	Defines an SSL policy name and enters SSL policy configuration mode.
Step 4	**ip address local** *ip-address* [**vrf** *vrf-name*] [**port** *port-number*] [**standby** *redundancy-name*] **Example:** `Device(config-crypto-ssl-policy)# ip address local 10.0.0.1 port 446`	Specifies the local IP address to start the TCP listener. **Note** Either this command or the **ip interface local** command is mandatory.
Step 5	**ip interface local** *interface-name* [**vrf** *vrf-name*] [**port** *port-number*] [**standby** *redundancy-name*] **Example:** `Device(config-crypto-ssl-policy)# ip interface local FastEthernet redundancy1`	Specifies the local interface to start the TCP listener. **Note** Either this command or the **ip address local** command is mandatory.
Step 6	**pki trustpoint** *trustpoint-name* **sign** **Example:** `Device(config-crypto-ssl-policy)# pki trustpoint tp1 sign`	(Optional) Specifies the trustpoint to be used to send server certificate during an SSL handshake. **Note** If this command is not specified, a default self-signed trustpoint is used. If there is no default self-signed trustpoint, the system creates a default self-signed certificate.
Step 7	**ssl proposal** *proposal-name* **Example:** `Device(config-crypto-ssl-policy)# ssl proposal pr1`	(Optional) Specifies the cipher suites to be selected during an SSL handshake. **Note** If a proposal is not specified, the default proposal is used.
Step 8	**no shut** **Example:** `Device(config-crypto-ssl-policy)# no shut`	Starts the TCP listener based on the configuration.
Step 9	**end** **Example:** `Device(config-crypto-ssl-policy)# end`	Exits SSL policy configuration mode and returns to privileged EXEC mode.
Step 10	**show crypto ssl policy** [*policy-name*] **Example:** `Device# show crypto ssl policy`	(Optional) Displays the SSL policies.

What to Do Next

After configuring the SSL policy, configure the SSL profile to match the policy. For more information, see the “Configuring SSL Profile” section.

Configuring an SSL Profile

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **crypto ssl profile** *profile-name*
4. **aaa accounting list** *list-name*
5. **aaa authentication list** *list-name*
6. **aaa authorization group** [**override**] **list** *aaa-listname aaa-username*
7. **aaa authorization user** {**cached** | **list** *aaa-listname aaa-username*}
8. **match policy** *policy-name*
9. **match url** *url-name*
10. **no shut**
11. **end**
12. **show crypto ssl profile** [*profile-name*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**crypto ssl profile** *profile-name* **Example:** `Device(config)# crypto ssl profile profile1`	Defines an SSL profile and enters SSL profile configuration mode.
Step 4	**aaa accounting list** *list-name* **Example:** `Device(config-crypto-ssl-profile)# aaa accounting list list1`	Specifies authentication, authorization, and accounting (AAA) accounting method list.
Step 5	**aaa authentication list** *list-name* **Example:** `Device(config-crypto-ssl-profile)# aaa authentication list list2`	Specifies the AAA authentication method list.

	Command or Action	Purpose
Step 6	**aaa authorization group** [**override**] **list** *aaa-listname aaa-username* **Example:** `Device(config-crypto-ssl-profile)# aaa authorization group override list list1 user1`	Specifies the AAA method list and username for group authorization. • **group—**Specifies group authorization. • **override—**(Optional) Specifies that attributes from group authorization should take precedence while merging attributes. By default, user attributes take precedence. • *aaa-listname***—**AAA method list name. • *aaa-username***—**Username that must be used in the AAA authorization request. Refers to SSL authorization policy name defined on the device.
Step 7	**aaa authorization user** {**cached** | **list** *aaa-listname aaa-username*} **Example:** `Device(config-crypto-ssl-profile)# aaa authorization user list list1 user1`	Specifies the AAA method list and username for user authorization. • **user—**Specifies user authorization. • **cached—**Specifies that the attributes received during EAP authentication or obtained from the AAA preshared key must be cached. • *aaa-listname***—**AAA method list name. • *aaa-username***—**Specifies the username that must be used in the AAA authorization request.
Step 8	**match policy** *policy-name* **Example:** `Device(config-crypto-ssl-profile)# match address policy policy1`	Uses match statements to select an SSL profile for a peer based on the SSL policy name.
Step 9	**match url** *url-name* **Example:** `Device(config-crypto-ssl-profile)# match url www.abc.com`	Uses match statements to select an SSL profile for a peer based on the URL.
Step 10	**no shut** **Example:** `Device(config-crypto-ssl-profile)# no shut`	Specifies the profile cannot be shut until the policy specified in the **match policy** command is in use.
Step 11	**end** **Example:** `Device(config-crypto-ssl-profile)# end`	Exits SSL profile configuration mode and returns to privileged EXEC mode.

	Command or Action	Purpose
Step 12	**show crypto ssl profile** [*profile-name*] **Example:** `Device# show crypto ssl profile`	(Optional) Displays the SSL profile.

Configuring the SSL Authorization Policy

Perform this task to configure the SSL authorization policy.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **crypto ssl authorization policy** *policy-name*
4. **banner** *banner-text*
5. **client profile** *profile-name*
6. **def-domain** *domain-name*
7. Do one of the following:
   - **dns** *primary-server* [*secondary-server*]
   - **ipv6 dns** *primary-server* [*secondary-server*]
8. **dpd-interval** {**client** | **server**} *interval*
9. **homepage** *homepage-text*
10. **include-local-lan**
11. **ipv6 prefix** *prefix*
12. **keepalive** *seconds*
13. **module** *module-name*
14. **msie-proxy exception** *exception-name*
15. **msie-proxy option** {**auto** | **bypass** | **none**}
16. **msie-proxy server** {*ip-address* | *dns-name*}
17. **mtu** *bytes*
18. **netmask** *mask*
19. Do one of the following:
    - **pool** *name*
    - **ipv6 pool** *name*
20. **rekey time** *seconds*
21. Do one of the following:
    - **route set access-list** *acl-name*
    - **ipv6 route set access-list** *access-list-name*
22. **smartcard-removal-disconnect**
23. **split-dns** *string*
24. **timeout** {**disconnect** *seconds* | **idle** *seconds* | **session** *seconds*}
25. **wins** *primary-server* [*secondary-server*]
26. **end**
27. **show crypto ssl authorization policy** [*policy-name*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**crypto ssl authorization policy** *policy-name* **Example:** `Device(config)# crypto ssl authorization policy policy1`	Specifies the SSL authorization policy and enters SSL authorization policy configuration mode.
Step 4	**banner** *banner-text* **Example:** `Device(config-crypto-ssl-auth-policy)# banner  This is SSL VPN tunnel. NOTE: DO NOT dial emergency response numbers (e.g. 911,112) from software telephony clients. Your exact location and the appropriate emergency response agency may not be easily identified.`	Specifies the banner. The banner is displayed on successful tunnel set up.
Step 5	**client profile** *profile-name* **Example:** `Device(config-crypto-ssl-auth-policy)# client profile profile1`	Specifies the client profile. The profile must already be specified using the **crypto ssl profile** command.
Step 6	**def-domain** *domain-name* **Example:** `Device(config-crypto-ssl-auth-policy)# def-domain example.com`	Specifies the default domain. This parameter specifies the default domain that the client can use.
Step 7	Do one of the following: • **dns** *primary-server* [*secondary-server*] • **ipv6 dns** *primary-server* [*secondary-server*] **Example:** `Device(config-crypto-ssl-auth-policy)# dns 198.51.100.1 198.51.100.100`	Specifies an IPv4-or IPv6-based address for the primary and secondary Domain Name Service (DNS) servers. • *primary-server*—IP address of the primary DNS server. • *secondary-server*—(Optional) IP address of the secondary DNS server.

	Command or Action	Purpose
	Example: `Device(config-crypto-ssl-auth-policy)# ipv6 dns 2001:DB8:1::1 2001:DB8:2::2`	
Step 8	**dpd-interval** {**client** | **server**} *interval* **Example:** `Device(config-crypto-ssl-auth-policy)# dpd-interval client 1000`	Configures Dead Peer Detection (DPD).globally for the client or server. • **client—**DPD for the client mode. The default value is 300 (five minutes). • **server—**DPD for the server mode. The default value is 300. • *interval—*Interval, in seconds. The range is from 5 to 3600.
Step 9	**homepage** *homepage-text* **Example:** `Device(config-crypto-ssl-auth-policy)# homepage http://www.abc.com`	Specifies the SSL VPN home page URL.
Step 10	**include-local-lan** **Example:** `Device(config-crypto-ssl-auth-policy)# include-local-lan`	Permits the remote user to access resources on a local LAN, such as a network printer.
Step 11	**ipv6 prefix** *prefix* **Example:** `Device(config-crypto-ssl-auth-policy)# ipv6 prefix 64`	Defines the IPv6 prefix for IPv6 addresses. • *prefix—*Prefix length. The range is from 1 to 128.
Step 12	**keepalive** *seconds* **Example:** `Device(config-crypto-ssl-auth-policy)# keepalive 500`	Enables setting the minimum, maximum, and default values for keepalive, in seconds.
Step 13	**module** *module-name* **Example:** `Device(config-crypto-ssl-auth-policy)# module gina`	Enables the server gateway to download the appropriate module for VPN to connect to a specific group. • **dart—**Downloads the AnyConnect Diagnostic and Reporting Tool (DART) module. • **gina—**Downloads the Start Before Logon (SBL) module.
Step 14	**msie-proxy exception** *exception-name* **Example:** `Device(config-crypto-ssl-auth-policy)# msie-proxy exception 198.51.100.2`	The DNS name or the IP address specified in the *exception-name* argument that must not be sent via the proxy.

	Command or Action	Purpose
Step 15	**msie-proxy option** {**auto** | **bypass** | **none**} **Example:** `Device(config-crypto-ssl-auth-policy)# msie-proxy option bypass`	Specifies the proxy settings for the Microsoft Internet Explorer browser. The proxy settings are required to specify an internal proxy server and to route the browser traffic through the proxy server when connecting to the corporate network. • **auto—**Browser is configured to auto detect proxy server settings. • **bypass—**Local addresses bypass the proxy server. • **none—**Browser is configured to not use the proxy server.
Step 16	**msie-proxy server** {*ip-address* | *dns-name*} **Example:** `Device(config-crypto-ssl-auth-policy)# msie-proxy server 198.51.100.2`	The IP address or the DNS name, optionally followed by the port number, of the proxy server. **Note** This command is required if the **msie-proxy option bypass** command is specified.
Step 17	**mtu** *bytes* **Example:** `Device(config-crypto-ssl-auth-policy)# mtu 1000`	(Optional) Enables setting the minimum, maximum, and default MTU value. **Note** The value specified in this command overrides the default MTU specified in Cisco AnyConnect Secure client configuration. If not specified, the value specified Cisco AnyConnect Secure client configuration is the MTU value. If the calculated MTU is less than the MTU specified in this command, this command is ignored.
Step 18	**netmask** *mask* **Example:** `Device(config-crypto-ssl-auth-policy)# netmask 255.255.255.0`	Specifies the netmask of the subnet from which the IP address is assigned to the client. • *mask—*Subnet mask address.

Step 19	Do one of the following:
	• **pool** *name*
	• **ipv6 pool** *name*
	
	Example:
	`Device(config-crypto-ssl-auth-policy)# pool abc`
	
	Example:
	`Device(config-crypto-ssl-auth-policy)# ipv6 pool ipv6pool`
		Defines a local IPv4 or IPv6 address pool for assigning IP addresses to the remote access client.
		• *name—*Name of the local IP address pool.
		Note The local IP address pool must already be defined using the **ip local pool** command.

	Command or Action	Purpose
Step 20	**rekey time** *seconds* **Example:** `Device(config-crypto-ssl-auth-policy)# rekey time 1110`	Specifies the rekey interval, in seconds. The default value is 3600.

Step 21	Do one of the following:
	• **route set access-list** *acl-name*
	• **ipv6 route set access-list** *access-list-name*
	
	Example:
	`Device(config-crypto-ssl-auth-policy)# route set access-list acl1`
	
	Example:
	`Device(config-crypto-ssl-auth-policy)# ipv6 route set access-list acl1`
		Establishes IPv4 or IPv6 routes via the access list that must be secured through tunnels.
		• *acl-name*—Access list name.

Step 22	**smartcard-removal-disconnect** **Example:** `Device(config-crypto-ssl-auth-policy)# smartcard-removal-disconnect`	Enables smartcard removal disconnect and specifies that the client should terminate the session when the smart card is removed.
Step 23	**split-dns** *string* **Example:** `Device(config-crypto-ssl-auth-policy)# split-dns example.com example.net`	Allows you to specify up to ten split domain names, which the client should use for private networks.
Step 24	**timeout** {**disconnect** *seconds* | **idle** *seconds* | **session** *seconds*} **Example:** `Device(config-crypto-ssl-auth-policy)# timeout disconnect 10000`	Specifies the timeout, in seconds. • **disconnect** *seconds*—Specifies the retry duration, in seconds, for Cisco AnyConnect client to reconnect to the server gateway. The default value is 0. • **idle** *seconds*—Specifies the idle timeout, in seconds. The default value is 1800 (30 minutes). • **session** *seconds*—Specifies the session timeout, in seconds. The default value is 43200 (12 hours).
Step 25	**wins** *primary-server* [*secondary-server*] **Example:** `Device(config-crypto-ssl-auth-policy)# wins 203.0.113.1 203.0.113.115`	Specifies the internal Windows Internet Naming Service (WINS) server addresses. • *primary-server*—IP address of the primary WINS server. • *secondary-server*—(Optional) IP address of the secondary WINS server.

	Command or Action	Purpose
Step 26	**end** **Example:** `Device(config-crypto-ssl-auth-policy)# end`	Exits SSL authorization policy configuration mode and returns to privileged EXEC mode.
Step 27	**show crypto ssl authorization policy** [*policy-name*] **Example:** `Device(config-crypto-ssl-auth-policy)# show crypto ssl authorization policy`	(Optional) Displays the SSL authorization policy.

Verifying SSL VPN Configurations

This section describes how to use **show** commands to verify the SSL VPN configurations:

SUMMARY STEPS

1. **enable**
2. **show crypto ssl proposal** [*name*]
3. **show crypto ssl policy** [*name*]
4. **show crypto ssl profile** [*name*]
5. **show crypto ssl authorization policy** [*name*]
6. **show crypto ssl session** {**user** *user-name* | **profile** *profile-name*}
7. **show crypto ssl stats** [**profile** *profile-name*] [**tunnel**] [**detail**]
8. **clear crypto ssl session** {**profile** *profile-name*| **user** *user-name*}

DETAILED STEPS

Step 1 **enable**

Example:
```
Device> enable
```
Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **show crypto ssl proposal** [*name*]

Example:
```
Device# show crypto ssl proposal

SSL Proposal: sslprop
    Protection: 3DES-SHA1
```

Displays the SSL proposal.

Step 3 **show crypto ssl policy** [*name*]

Example:

```
Device# show crypto ssl policy

 SSL Policy: sslpolicy
  Status     : ACTIVE
  Proposal   : sslprop
  IP Address : 10.78.106.23
  Port       : 443
  fvrf       : 0
  Trust Point: TP-self-signed-1183786860
  Redundancy : none
```

Displays the SSL policies.

Step 4 **show crypto ssl profile** [*name*]

Example:

```
Device# show crypto ssl profile

SSL Profile: sslprofile
 Status: ACTIVE
 Match Criteria:
   URL: none
   Policy:
    sslpolicy
 AAA accounting List      : local
 AAA authentication List  :none
 AAA authorization cached  :true
 AAA authorization user List   :default
 AAA authorization user name: sslauth
 AAA authorization group List   :none
 AAA authorization group name: none
 Authentication Mode      : user credentials
 Interface                : SSLVPN-VIF1
   Status: ENABLE
```

Displays the SSL profile.

Step 5 **show crypto ssl authorization policy** [*name*]

Example:

```
Device# show crypto ssl authorization policy

SSL Auth Policy: sslauth
 V4 Parameter:
   Address Pool: SVC_POOL
   Netmask: 255.255.255.0
   Route ACL : split-include
 Banner                   : none
 Home Page                : none
 Idle timeout             : 300
 Disconnect Timeout       : 0
 Session Timeout          : 43200
 Keepalive Interval       : 0
 DPD Interval             : 300
 Rekey
   Interval: 0
   Method  : none
 Split DNS                : none
 Default domain           : none
 Proxy Settings
     Server: none
```

```
    Option: NULL
    Exception(s): none
Anyconnect Profile Name :
SBL Enabled             : NO
MAX MTU                 : 1406
Smart Card
Removal Disconnect      : NO
```

Displays the SSL authorization policy.

Step 6 **show crypto ssl session** {**user** *user-name* | **profile** *profile-name*}

Example:

```
Device# show crypto ssl session user LAB

Session Type      : Full Tunnel
Client User-Agent : AnyConnect Windows 3.0.08057

Username          : LAB                  Num Connection : 1
Public IP         : 72.163.209.245
Profile           : sslprofile              Policy Group   : sslauth
Last-Used         : 00:00:02             Created        : *00:58:44.219 PDT Thu Jul 25 2013
Session Timeout   : 43200             Idle Timeout   : 300
DPD GW Timeout    : 300             DPD CL Timeout : 300
Address Pool      : sslvpn-pool     MTU Size       : 1406
Rekey Time        : 0                    Rekey Method   :
Lease Duration    : 43200
Tunnel IP         : 50.1.1.2             Netmask        : 255.255.255.0
Rx IP Packets     : 0                     Tx IP Packets  : 125
CSTP Started      : 00:01:12          Last-Received  : 00:00:02
CSTP DPD-Req sent : 0             Virtual Access : 0
Msie-ProxyServer  : None          Msie-PxyPolicy : Disabled
Msie-Exception    :
Client Ports      : 34552

Device# show crypto ssl session profile sslprofile

SSL profile name: sslprofile
Client_Login_Name  Client_IP_Address  No_of_Connections  Created  Last_Used
LAB                72.163.209.245             1         00:00:33  00:00:00
Error receiving show session info from remote cores
```

Displays SSL VPN session information.

Step 7 **show crypto ssl stats** [**profile** *profile-name*] [**tunnel**] [**detail**]

Example:

```
Device# show crypto ssl stats

SSLVPN Global statistics:
    Active connections       : 0          AAA pending reqs         : 0
    Peak connections         : 1          Peak time                : 1w6d
    Authentication failures  : 21
    VPN session timeout      : 1          VPN idle timeout         : 0
    User cleared VPN sessions: 0          Login Denined            : 0
    Connect succeed          : 1          Connect failed           : 0
    Reconnect succeed        : 0          Reconnect failed         : 0
    IP Addr Alloc Failed     : 0          VA creation failed       : 0
    Route Insertion Failed   : 0
    IPV6 Addr Alloc Failed   : 0
    IPV6 Route Insert Failed : 0
    IPV6 Hash Insert Failed  : 0
    IPV6 STC Alloc Failed    : 0
    in  CSTP control         : 5          out CSTP control         : 3
    in  CSTP data            : 21         out CSTP data            : 8

Device# show crypto ssl stats tunnel profile prf1
```

```
SSLVPN Profile name : prf1
Tunnel Statistics:
    Active connections       : 0
    Peak connections         : 0          Peak time                : never
    Connect succeed          : 0          Connect failed           : 0
    Reconnect succeed        : 0          Reconnect failed         : 0
    DPD timeout              : 0
  Client
    in  CSTP frames          : 0          in  CSTP control         : 0
    in  CSTP data            : 0          in  CSTP bytes           : 0
    out CSTP frames          : 0          out CSTP control         : 0
    out CSTP data            : 0          out CSTP bytes           : 0
    cef in  CSTP data frames : 0          cef in  CSTP data bytes  : 0
    cef out CSTP data frames : 0          cef out CSTP data bytes  : 0
  Server
    In  IP pkts              : 0          In  IP bytes             : 0
    Out IP pkts              : 0          Out IP bytes             : 0
```

Displays SSL VPN statistics.

Step 8 **clear crypto ssl session** {**profile** *profile-name*| **user** *user-name*}

Example:

```
Device# clear crypto ssl session sslprofile
```

Clears SSL VPN session.

Configuration Examples for SSL VPN

Example: Specifying the AnyConnect Image and Profile

The following example shows how to specify the Cisco AnyConnect image and profile.

```
Device> enable
Device# configure terminal
Device(config)# crypto vpn anyconnect bootflash:/webvpn/anyconnect-win-3.1.04072-k9.pkg
sequence 1
Device(config)# crypto vpn anyconnect profile Employee bootflash:/Employee.xml
Device(config)# end
```

Example: Configuring SSL Proposal

The following example shows how to configure the SSL proposal.

```
Device> enable
Device# configure terminal
Device(config)# crypto ssl proposal proposal1
Device(config-crypto-ssl-proposal)# protection rsa-3des-ede-sha1 rsa-aes128-sha1
Device(config-crypto-ssl-proposal)# end
```

Example: Configuring SSL Policy

The following example shows how to configure an SSL policy.

```
Device> enable
Device# configure terminal
Device(config)# crypto ssl policy policy1
Device(config-crypto-ssl-policy)# ip address local 10.0.0.1 port 443
Device(config-crypto-ssl-policy)# pki trustpoint tp1 sign
Device(config-crypto-ssl-policy)# ssl proposal proposal1
Device(config-crypto-ssl-policy)# no shut
Device(config-crypto-ssl-policy)# end
```

Example: Configuring SSL Profile

The following example shows how to configure an SSL profile.

```
Device> enable
Device# configure terminal
Device(config)# crypto ssl profile profile1
Device(config-crypto-ssl-profile)# aaa accounting list list1
Device(config-crypto-ssl-profile)# aaa authentication list list2
Device(config-crypto-ssl-profile)# aaa authorization group override list list1 user1
Device(config-crypto-ssl-profile)# aaa authorization user list list1 user1
Device(config-crypto-ssl-profile)# match address policy policy1
Device(config-crypto-ssl-profile)# match url www.abc.com
Device(config-crypto-ssl-profile)# no shut
Device(config-crypto-ssl-profile)# end
```

Example: Configuring SSL Authorization Policy

The following example shows how to configure an SSL authorization policy.

```
Device> enable
Device# configure terminal
Device(config)# crypto ssl authorization policy policy1
Device(config-crypto-ssl-auth-policy)# banner This is SSL VPN tunnel.
Device(config-crypto-ssl-auth-policy)# client profile profile1
Device(config-crypto-ssl-auth-policy)# def-domain cisco
Device(config-crypto-ssl-auth-policy)# dns 198.51.100.1 198.51.100.100
Device(config-crypto-ssl-auth-policy)# dpd client 1000
Device(config-crypto-ssl-auth-policy)# homepage http://www.abc.com
Device(config-crypto-ssl-auth-policy)# include-local-lan
Device(config-crypto-ssl-auth-policy)# keepalive 500
Device(config-crypto-ssl-auth-policy)# module gina
Device(config-crypto-ssl-auth-policy)# msie-proxy exception 198.51.100.2
Device(config-crypto-ssl-auth-policy)# msie-proxy option bypass
Device(config-crypto-ssl-auth-policy)# msie-proxy server 198.51.100.2
Device(config-crypto-ssl-auth-policy)# mtu 1000
Device(config-crypto-ssl-auth-policy)# netmask 255.255.255.0
Device(config-crypto-ssl-auth-policy)# pool abc
Device(config-crypto-ssl-auth-policy)# rekey interval 1110
Device(config-crypto-ssl-auth-policy)# route set access-list acl1
Device(config-crypto-ssl-auth-policy)# smartcard-removal-disconnect
Device(config-crypto-ssl-auth-policy)# split-dns abc1
Device(config-crypto-ssl-auth-policy)# timeout disconnect 10000
Device(config-crypto-ssl-auth-policy)# wins 203.0.113.1 203.0.113.115
Device(config-crypto-ssl-auth-policy)# end
```

The following example shows how to enable IPv6 support for SSL VPN.

```
Device> enable
Device# configure terminal
Device(config)# crypto ssl authorization policy policy1
```

```
Device(config-crypto-ssl-auth-policy)# banner This is SSL VPN tunnel.
Device(config-crypto-ssl-auth-policy)# client profile profile1
Device(config-crypto-ssl-auth-policy)# def-domain cisco
Device(config-crypto-ssl-auth-policy)# ipv6 dns 2001:DB8:1::1 2001:DB8:2::2
Device(config-crypto-ssl-auth-policy)# dpd client 1000
Device(config-crypto-ssl-auth-policy)# homepage http://www.abc.com
Device(config-crypto-ssl-auth-policy)# include-local-lan
Device(config-crypto-ssl-auth-policy)# ipv6 prefix 64
Device(config-crypto-ssl-auth-policy)# ipv6 route set access-list acl1
Device(config-crypto-ssl-auth-policy)# keepalive 500
Device(config-crypto-ssl-auth-policy)# module gina
Device(config-crypto-ssl-auth-policy)# msie-proxy exception 198.51.100.2
Device(config-crypto-ssl-auth-policy)# msie-proxy option bypass
Device(config-crypto-ssl-auth-policy)# msie-proxy server 198.51.100.2
Device(config-crypto-ssl-auth-policy)# mtu 1000
Device(config-crypto-ssl-auth-policy)# ipv6 pool ipv6pool
Device(config-crypto-ssl-auth-policy)# rekey interval 1110
Device(config-crypto-ssl-auth-policy)# route set access-list acl1
Device(config-crypto-ssl-auth-policy)# smartcard-removal-disconnect
Device(config-crypto-ssl-auth-policy)# split-dns abc1
Device(config-crypto-ssl-auth-policy)# timeout disconnect 10000
Device(config-crypto-ssl-auth-policy)# wins 203.0.113.1 203.0.113.115
Device(config-crypto-ssl-auth-policy)# end
```

Additional References for SSL VPN

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Security commands	• Cisco IOS Security Command Reference Commands A to C • Cisco IOS Security Command Reference Commands D to L • Cisco IOS Security Command Reference Commands M to R • Cisco IOS Security Command Reference Commands S to Z
Recommended cryptographic algorithms	Next Generation Encryption

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for SSL VPN

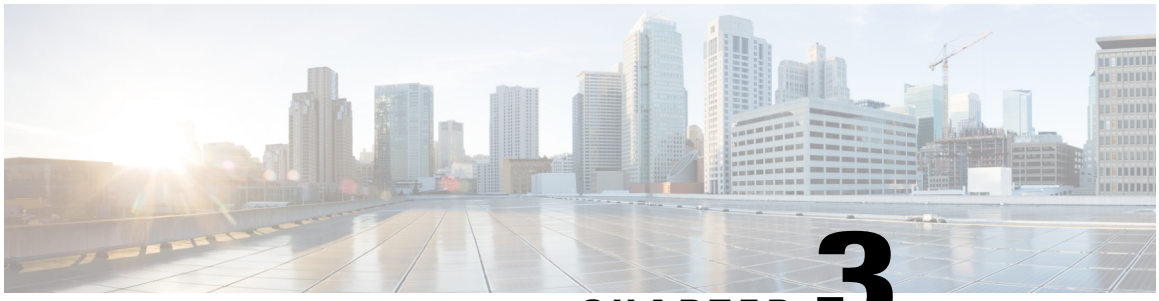
The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for SSL VPN

Feature Name	Release	Feature Information
XE SSL VPN Support	Cisco IOS XE Release 3.12S	SSL VPN provides support in the Cisco IOS software for remote user access to enterprise networks from anywhere on the Internet. Remote access is provided through a Secure Socket Layer (SSL)-enabled SSL VPN gateway. The SSL VPN gateway allows remote users to establish a secure VPN tunnel. The XE SSL VPN Support feature provides a comprehensive solution that allows easy access to a broad range of web resources and web-enabled applications using native HTTP over SSL (HTTPS) browser support through the full-tunnel client support. In Cisco IOS XE Release 3.12.1S, this feature supported Cisco CSR 1000V Series Cloud Services Router. The following commands were introduced by this feature: **aaa accounting list**, **aaa authentication list**, **aaa authorization**, **banner**, **client profile**, **crypto ssl authorization policy**, **crypto ssl policy**, **crypto ssl profile**, **crypto ssl proposal**, **def-domain**, **dns**, **dpd**, **homepage**, **include-local-lan**, **ip address local**, **ip interface local**, **keepalive**, **match policy**, **match url**, **module**, **msie-proxy**, **mtu**, **netmask**, **pki trustpoint**, **pool**, **protection**, **rekey interval**, **route set access-list**, **show crypto ssl authorization policy**, **show crypto ssl policy**, **show crypto ssl profile**, **show crypto ssl proposal**, **shut**, **smartcard-removal-disconnect**, **split-dns**, **ssl proposal**, **timeout**, **wins**.

Feature Name	Release	Feature Information
SSL VPN MIB	Cisco IOS XE Release 3.15S	The SSL VPN MIB represents the Cisco implementation-specific attributes of a Cisco entity that implements SSL VPN. The MIB provides operational information in Cisco's SSL VPN implementation by managing the SSLVPN, trap control, and notification groups. For example, the SSL VPN MIB provides the number of active SSL tunnels on the device.



CHAPTER 3

SSL VPN - IPv6 Support

The SSL VPN - IPv6 Support feature implements support for IPv6 transport over IPv4 SSL VPN session between a client, such as Cisco AnyConnect Mobility Client, and SSL VPN.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for SSL VPN - IPv6 Support

- The **ipv6 unicast-routing** command must be enabled globally.

Note This feature is supported on the Cisco CSR 1000V Series Cloud Services Router only.

Information About SSL VPN - IPv6 Support

IPv6 for SSL VPN

The SSL VPN - IPv6 Support feature implements an dual stack IPv6 over IPv4 session between a client, such as Cisco AnyConnect Mobility Client, and SSL VPN. An IPv6 session is activated on SSL VPN when the following commands in the SSL authorization policy:

- **ipv6 dns**
- **ipv6 pool**
- **ipv6 prefix**
- **ipv6 route**

1. When Cisco AnyConnect Mobility Client sends a connection request for a session, SSL VPN checks whether the request pertains to a new session or a session reconnect or rekey. If the request pertains to an existing session and an IPv6 address is already associated and allocated to the session, the allocated IPv6 address is used. If there is no associated IPv6 address, the value of the framed address RADIUS attribute is sent to the client or an IPv6 address is assigned from the IPv6 pool.

Note When SSL VPN receives a connection request from a client, an IPv6 session is triggered when the client sends the **X-CSTP-Full-IPv6-Capability: true** message as a part of the connection request. This prevents from sending unsupported IPv6 attributes to the client.

2. After an IPv6 address is allocated, the IPv6 session hash is added to the IPv6 hash table. The session hash is created based on the IPv6 address of the tunnel and looked up via the address and the VRF. If the hash is not inserted to the table, the session is disabled and an IPv4 session is established.
3. The static routes are added to the virtual access interface for the tunnel IP addresses. The IPv6 routes are added first followed by the IPv4 routes. If IPv6 route addition fails, the IPv6 session is disabled. If both IPv6 and IPv4 route additions fail, the session is aborted.
4. A response containing the IPv4 attributes and the IPv6 tunnel address, prefix length, split tunnel IPv6 routes, IPv6 DNS servers (primary and secondary) are pushed to the client, from the gateway indicating that the session is up.
5. On receiving the response, the client creates an adaptor and assigns an IP address to the adaptor. All IPv6 packets are sent to the adaptor. The client adds and encrypts an 8-byte CSTP header and an SSL header, transporting the IPv6 packet to the gateway.
6. The gateway receives the IPv6 packet, decrypts, and sends the packet to SSL VPN. SSL VPN check the packet for control packet or data packet. If the packet is a data packet, the CSTP header is removed and the raw IPv6 packet is forwarded to the IPv6 queue to route it the virtual access interface.

   On Cisco CSR 1000V Series Cloud Services Router, the session is looked up based on the IPv6 address and the VRF to find the appropriate session from the session IPv6 hash table.

Supported RADIUS Attributes

The following RADIUS attribute-value pairs are available for IPv6 support on SSL VPN:

Table 2: Supported RADIUS Attributes

RADIUS Attribute	Description
cryptovpn-ssl:prefix-len	Sets the IPv6 prefix length for the session.
cryptovpn-ssl:ipv6-dns-servers-addr	Specifies the primary and secondary IPv6 DNS servers.
cryptovpn-ssl:route-set	Specifies the IPv6 access list to be pushed to the client.
cryptovpn-ssl:ipv6-addr-pool	Specifies the IPv6 tunnel address pool.
cryptovpn-ssl:ipv6_addr	Specifies the framed IPv6 address to be pushed to the client.

How to Configure SSL VPN - IPv6 Support

Configuring the SSL Authorization Policy

Perform this task to configure the SSL authorization policy.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **crypto ssl authorization policy** *policy-name*
4. **banner** *banner-text*
5. **client profile** *profile-name*
6. **def-domain** *domain-name*
7. Do one of the following:
   - **dns** *primary-server* [*secondary-server*]
   - **ipv6 dns** *primary-server* [*secondary-server*]
8. **dpd-interval** {**client** | **server**} *interval*
9. **homepage** *homepage-text*
10. **include-local-lan**
11. **ipv6 prefix** *prefix*
12. **keepalive** *seconds*
13. **module** *module-name*
14. **msie-proxy exception** *exception-name*
15. **msie-proxy option** {**auto** | **bypass** | **none**}
16. **msie-proxy server** {*ip-address* | *dns-name*}
17. **mtu** *bytes*
18. **netmask** *mask*
19. Do one of the following:
    - **pool** *name*
    - **ipv6 pool** *name*
20. **rekey time** *seconds*
21. Do one of the following:
    - **route set access-list** *acl-name*
    - **ipv6 route set access-list** *access-list-name*
22. **smartcard-removal-disconnect**
23. **split-dns** *string*
24. **timeout** {**disconnect** *seconds* | **idle** *seconds* | **session** *seconds*}
25. **wins** *primary-server* [*secondary-server*]
26. **end**
27. **show crypto ssl authorization policy** [*policy-name*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**crypto ssl authorization policy** *policy-name* **Example:** `Device(config)# crypto ssl authorization policy policy1`	Specifies the SSL authorization policy and enters SSL authorization policy configuration mode.
Step 4	**banner** *banner-text* **Example:** `Device(config-crypto-ssl-auth-policy)# banner  This is SSL VPN tunnel. NOTE: DO NOT dial emergency response numbers (e.g. 911,112) from software telephony clients. Your exact location and the appropriate emergency response agency may not be easily identified.`	Specifies the banner. The banner is displayed on successful tunnel set up.
Step 5	**client profile** *profile-name* **Example:** `Device(config-crypto-ssl-auth-policy)# client profile profile1`	Specifies the client profile. The profile must already be specified using the **crypto ssl profile** command.
Step 6	**def-domain** *domain-name* **Example:** `Device(config-crypto-ssl-auth-policy)# def-domain example.com`	Specifies the default domain. This parameter specifies the default domain that the client can use.
Step 7	Do one of the following: • **dns** *primary-server* [*secondary-server*] • **ipv6 dns** *primary-server* [*secondary-server*] **Example:** `Device(config-crypto-ssl-auth-policy)# dns 198.51.100.1 198.51.100.100`	Specifies an IPv4-or IPv6-based address for the primary and secondary Domain Name Service (DNS) servers. • *primary-server*—IP address of the primary DNS server. • *secondary-server*—(Optional) IP address of the secondary DNS server.

	Command or Action	Purpose
	Example: `Device(config-crypto-ssl-auth-policy)# ipv6 dns 2001:DB8:1::1 2001:DB8:2::2`	
Step 8	**dpd-interval** {**client** | **server**} *interval* **Example:** `Device(config-crypto-ssl-auth-policy)# dpd-interval client 1000`	Configures Dead Peer Detection (DPD).globally for the client or server. • **client—**DPD for the client mode. The default value is 300 (five minutes). • **server—**DPD for the server mode. The default value is 300. • *interval—*Interval, in seconds. The range is from 5 to 3600.
Step 9	**homepage** *homepage-text* **Example:** `Device(config-crypto-ssl-auth-policy)# homepage http://www.abc.com`	Specifies the SSL VPN home page URL.
Step 10	**include-local-lan** **Example:** `Device(config-crypto-ssl-auth-policy)# include-local-lan`	Permits the remote user to access resources on a local LAN, such as a network printer.
Step 11	**ipv6 prefix** *prefix* **Example:** `Device(config-crypto-ssl-auth-policy)# ipv6 prefix 64`	Defines the IPv6 prefix for IPv6 addresses. • *prefix—*Prefix length. The range is from 1 to 128.
Step 12	**keepalive** *seconds* **Example:** `Device(config-crypto-ssl-auth-policy)# keepalive 500`	Enables setting the minimum, maximum, and default values for keepalive, in seconds.
Step 13	**module** *module-name* **Example:** `Device(config-crypto-ssl-auth-policy)# module gina`	Enables the server gateway to download the appropriate module for VPN to connect to a specific group. • **dart—**Downloads the AnyConnect Diagnostic and Reporting Tool (DART) module. • **gina—**Downloads the Start Before Logon (SBL) module.
Step 14	**msie-proxy exception** *exception-name* **Example:** `Device(config-crypto-ssl-auth-policy)# msie-proxy exception 198.51.100.2`	The DNS name or the IP address specified in the *exception-name* argument that must not be sent via the proxy.

	Command or Action	Purpose
Step 15	**msie-proxy option** {**auto** | **bypass** | **none**} **Example:** `Device(config-crypto-ssl-auth-policy)# msie-proxy option bypass`	Specifies the proxy settings for the Microsoft Internet Explorer browser. The proxy settings are required to specify an internal proxy server and to route the browser traffic through the proxy server when connecting to the corporate network. • **auto—**Browser is configured to auto detect proxy server settings. • **bypass—**Local addresses bypass the proxy server. • **none—**Browser is configured to not use the proxy server.
Step 16	**msie-proxy server** {*ip-address* | *dns-name*} **Example:** `Device(config-crypto-ssl-auth-policy)# msie-proxy server 198.51.100.2`	The IP address or the DNS name, optionally followed by the port number, of the proxy server. **Note** This command is required if the **msie-proxy option bypass** command is specified.
Step 17	**mtu** *bytes* **Example:** `Device(config-crypto-ssl-auth-policy)# mtu 1000`	(Optional) Enables setting the minimum, maximum, and default MTU value. **Note** The value specified in this command overrides the default MTU specified in Cisco AnyConnect Secure client configuration. If not specified, the value specified Cisco AnyConnect Secure client configuration is the MTU value. If the calculated MTU is less than the MTU specified in this command, this command is ignored.
Step 18	**netmask** *mask* **Example:** `Device(config-crypto-ssl-auth-policy)# netmask 255.255.255.0`	Specifies the netmask of the subnet from which the IP address is assigned to the client. • *mask—*Subnet mask address.

Step 19	Do one of the following:
	• **pool** *name*
	• **ipv6 pool** *name*
	
	Example:
	`Device(config-crypto-ssl-auth-policy)# pool abc`
	
	Example:
	`Device(config-crypto-ssl-auth-policy)# ipv6 pool ipv6pool`
		Defines a local IPv4 or IPv6 address pool for assigning IP addresses to the remote access client.
		• *name—*Name of the local IP address pool.
		Note The local IP address pool must already be defined using the **ip local pool** command.

	Command or Action	Purpose
Step 20	**rekey time** *seconds* **Example:** `Device(config-crypto-ssl-auth-policy)# rekey time 1110`	Specifies the rekey interval, in seconds. The default value is 3600.

Step 21	Do one of the following:
	• **route set access-list** *acl-name*
	• **ipv6 route set access-list** *access-list-name*
	
	Example:
	`Device(config-crypto-ssl-auth-policy)# route set access-list acl1`
	
	Example:
	`Device(config-crypto-ssl-auth-policy)# ipv6 route set access-list acl1`
		Establishes IPv4 or IPv6 routes via the access list that must be secured through tunnels.
		• *acl-name*—Access list name.

Step 22	**smartcard-removal-disconnect** **Example:** `Device(config-crypto-ssl-auth-policy)# smartcard-removal-disconnect`	Enables smartcard removal disconnect and specifies that the client should terminate the session when the smart card is removed.
Step 23	**split-dns** *string* **Example:** `Device(config-crypto-ssl-auth-policy)# split-dns example.com example.net`	Allows you to specify up to ten split domain names, which the client should use for private networks.
Step 24	**timeout** {**disconnect** *seconds* | **idle** *seconds* | **session** *seconds*} **Example:** `Device(config-crypto-ssl-auth-policy)# timeout disconnect 10000`	Specifies the timeout, in seconds. • **disconnect** *seconds*—Specifies the retry duration, in seconds, for Cisco AnyConnect client to reconnect to the server gateway. The default value is 0. • **idle** *seconds*—Specifies the idle timeout, in seconds. The default value is 1800 (30 minutes). • **session** *seconds*—Specifies the session timeout, in seconds. The default value is 43200 (12 hours).
Step 25	**wins** *primary-server* [*secondary-server*] **Example:** `Device(config-crypto-ssl-auth-policy)# wins 203.0.113.1 203.0.113.115`	Specifies the internal Windows Internet Naming Service (WINS) server addresses. • *primary-server*—IP address of the primary WINS server. • *secondary-server*—(Optional) IP address of the secondary WINS server.

	Command or Action	Purpose
Step 26	**end** **Example:** `Device(config-crypto-ssl-auth-policy)# end`	Exits SSL authorization policy configuration mode and returns to privileged EXEC mode.
Step 27	**show crypto ssl authorization policy** [*policy-name*] **Example:** `Device(config-crypto-ssl-auth-policy)# show crypto ssl authorization policy`	(Optional) Displays the SSL authorization policy.

Verifying SSL Authorization Policy Configuration

Perform this task to verify the SSL authorization policy configuration.

SUMMARY STEPS

1. **enable**
2. **show crypto ssl authorization policy** [*name*]
3. **show crypto ssl stats** [**profile** *profile-name*] [**tunnel**] [**detail**]

DETAILED STEPS

Step 1 **enable**

Example:
```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **show crypto ssl authorization policy** [*name*]

Example:
```
Device# show crypto ssl authorization policy

SSL Auth Policy: pol1
 V6 Parameter:
   Address Pool: none
   Prefix: none
   Route ACL : ipv6acl
   DNS  :
    2001:DB8:1::1
    2001:DB8:2::2
 V4 Parameter:
   Address Pool: none
   Netmask: none
```

```
   Route ACL : none
   DNS  : none
   WINS : none
 Banner                  : none
 Home Page               : none
 Idle timeout            : 1800
 Disconnect Timeout      : 0
 Session Timeout         : 43200
 Keepalive Interval      : 30
 Client DPD Interval     : 300
 Gateway DPD Interval    : 300
 Rekey
   Interval: 3600
   Method  : none
 Split DNS: none
 Default domain          : none
 Proxy Settings
     Server: none
     Option: NULL
     Exception(s): none
 Anyconnect Profile Name :
 Module                  : none
 MAX MTU                 : 1406
 Smart Card
 Removal Disconnect      : NO
 Include Local LAN       : NO
 Disable Always On       : NO


SSL Auth Policy: sslauth
 V6 Parameter:
   Address Pool: sslvpn6
   Prefix: 120
   Route ACL : none
   DNS  : none
 V4 Parameter:
   Address Pool: sslvpn
   Netmask: 255.255.255.0
   Route ACL : sslvpn
   DNS  : none
   WINS : none
 Banner                  : none
 Home Page               : none
 Idle timeout            : 1800
 Disconnect Timeout      : 0
 Session Timeout         : 1000
 Keepalive Interval      : 30
 Client DPD Interval     : 300
 Gateway DPD Interval    : 300
 Rekey
   Interval: 3600
   Method  : none
 Split DNS: none
 Default domain          : none
 Proxy Settings
     Server: none
     Option: NULL
     Exception(s): none
 Anyconnect Profile Name :
 Module                  : none
 MAX MTU                 : 1406
 Smart Card
 Removal Disconnect      : NO
 Include Local LAN       : NO
 Disable Always On       : NO
```

Displays the SSL authorization policy.

Step 3 **show crypto ssl stats** [**profile** *profile-name*] [**tunnel**] [**detail**]

Example:

```
Device# show crypto ssl stats

SSLVPN Global statistics:
    Active connections       : 0          AAA pending reqs         : 0
    Peak connections         : 1          Peak time                : 1w6d
    Authentication failures  : 21
    VPN session timeout      : 1          VPN idle timeout         : 0
    User cleared VPN sessions: 0          Login Denied             : 0
    Connect succeed          : 1          Connect failed           : 0
    Reconnect succeed        : 0          Reconnect failed         : 0
    IP Addr Alloc Failed     : 0          VA creation failed       : 0
    Route Insertion Failed   : 0
    IPV6 Addr Alloc Failed   : 0
    IPV6 Route Insert Failed : 0
    IPV6 Hash Insert Failed  : 0
    IPV6 STC Alloc Failed    : 0
    in  CSTP control         : 5          out CSTP control         : 3
    in  CSTP data            : 21         out CSTP data            : 8
```

Displays SSL VPN statistics.

Configuration Examples for SSL VPN - IPv6 Support

Example: Configuring SSL Authorization Policy

The following example shows how to configure an SSL authorization policy.

```
Device> enable
Device# configure terminal
Device(config)# crypto ssl authorization policy policy1
Device(config-crypto-ssl-auth-policy)# banner This is SSL VPN tunnel.
Device(config-crypto-ssl-auth-policy)# client profile profile1
Device(config-crypto-ssl-auth-policy)# def-domain cisco
Device(config-crypto-ssl-auth-policy)# dns 198.51.100.1 198.51.100.100
Device(config-crypto-ssl-auth-policy)# dpd client 1000
Device(config-crypto-ssl-auth-policy)# homepage http://www.abc.com
Device(config-crypto-ssl-auth-policy)# include-local-lan
Device(config-crypto-ssl-auth-policy)# keepalive 500
Device(config-crypto-ssl-auth-policy)# module gina
Device(config-crypto-ssl-auth-policy)# msie-proxy exception 198.51.100.2
Device(config-crypto-ssl-auth-policy)# msie-proxy option bypass
Device(config-crypto-ssl-auth-policy)# msie-proxy server 198.51.100.2
Device(config-crypto-ssl-auth-policy)# mtu 1000
Device(config-crypto-ssl-auth-policy)# netmask 255.255.255.0
Device(config-crypto-ssl-auth-policy)# pool abc
Device(config-crypto-ssl-auth-policy)# rekey interval 1110
Device(config-crypto-ssl-auth-policy)# route set access-list acl1
Device(config-crypto-ssl-auth-policy)# smartcard-removal-disconnect
Device(config-crypto-ssl-auth-policy)# split-dns abc1
Device(config-crypto-ssl-auth-policy)# timeout disconnect 10000
Device(config-crypto-ssl-auth-policy)# wins 203.0.113.1 203.0.113.115
Device(config-crypto-ssl-auth-policy)# end
```

The following example shows how to enable IPv6 support for SSL VPN.

```
Device> enable
Device# configure terminal
Device(config)# crypto ssl authorization policy policy1
Device(config-crypto-ssl-auth-policy)# banner This is SSL VPN tunnel.
```

```
Device(config-crypto-ssl-auth-policy)# client profile profile1
Device(config-crypto-ssl-auth-policy)# def-domain cisco
Device(config-crypto-ssl-auth-policy)# ipv6 dns 2001:DB8:1::1 2001:DB8:2::2
Device(config-crypto-ssl-auth-policy)# dpd client 1000
Device(config-crypto-ssl-auth-policy)# homepage http://www.abc.com
Device(config-crypto-ssl-auth-policy)# include-local-lan
Device(config-crypto-ssl-auth-policy)# ipv6 prefix 64
Device(config-crypto-ssl-auth-policy)# ipv6 route set access-list acl1
Device(config-crypto-ssl-auth-policy)# keepalive 500
Device(config-crypto-ssl-auth-policy)# module gina
Device(config-crypto-ssl-auth-policy)# msie-proxy exception 198.51.100.2
Device(config-crypto-ssl-auth-policy)# msie-proxy option bypass
Device(config-crypto-ssl-auth-policy)# msie-proxy server 198.51.100.2
Device(config-crypto-ssl-auth-policy)# mtu 1000
Device(config-crypto-ssl-auth-policy)# ipv6 pool ipv6pool
Device(config-crypto-ssl-auth-policy)# rekey interval 1110
Device(config-crypto-ssl-auth-policy)# route set access-list acl1
Device(config-crypto-ssl-auth-policy)# smartcard-removal-disconnect
Device(config-crypto-ssl-auth-policy)# split-dns abc1
Device(config-crypto-ssl-auth-policy)# timeout disconnect 10000
Device(config-crypto-ssl-auth-policy)# wins 203.0.113.1 203.0.113.115
Device(config-crypto-ssl-auth-policy)# end
```

Example: Configuring SSL VPN with Local Authorization for IPv6 Session

Example: Configuring SSL VPN with Local Authorization on Cisco CSR 1000V Series Cloud Services Router

The following example shows how to configure IPv6 support for SSL VPN on Cisco CSR 1000V Series Cloud Services Router.

```
aaa new-model
!
aaa authentication login local-group-author-list local
aaa authorization network local-group-author-list local
!
crypto pki trustpoint trustpoint1
enrollment url http://192.168.3.1:80
revocation-check crl
!
crypto pki certificate map certmap1 1
 subject-name co cisco
!
crypto ssl proposal proposal1
 protection rsa-aes256-sha1
!
crypto ssl authorization policy author-policy1
 ipv6 prefix 64
 ipv6 pool v6-pool
 ipv6 dns  2001:DB8:1::11 2001:DB8:1::12
 ipv6 route set access-list subnet-acl v6-acl
!
crypto ssl policy policy1
 ssl proposal proposal1
 pki trustpoint trustpoint1 sign
 ip address local 121.0.0.92 port 443
!
crypto ssl profile profile1
 match policy policy1
 aaa authentication user-pass list local-group-author-list
 aaa authorization group user-pass list local-group-author-list author-policy1
 authentication remote user-credentials
!
interface Ethernet0/0
 ip address 121.0.0.92 255.255.255.0
 ipv6 address 2001:DB8:1::1/32
!
ipv6 local pool v6-pool 2001:DB8:1::10/32 48
!
```

```
ipv6 access-list v6-acl
permit ipv6 host 2001:DB8:1::20 any
permit ipv6 host 2001:DB8:1::30 any
```

Additional References for SSL VPN - IPv6 Support

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Security commands	• Cisco IOS Security Command Reference Commands A to C • Cisco IOS Security Command Reference Commands D to L • Cisco IOS Security Command Reference Commands M to R • Cisco IOS Security Command Reference Commands S to Z
Recommended cryptographic algorithms	Next Generation Encryption

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for SSL VPN - IPv6 Support

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 3: Feature Information for SSL VPN - IPv6 Support

Feature Name	Release	Feature Information
SSL VPN - IPv6 Support	Cisco IOS XE Release 3.15S	The SSL VPN - IPv6 Support feature implements support for IPv6 transport over IPv4 SSL VPN session between a client, such as Cisco AnyConnect Mobility Client, and SSL VPN. In Cisco IOS XE Release 3.15S, this feature was introduced on Cisco CSR 1000V Series Cloud Services Router. The following commands were introduced or modified: **ipv6 dns**, **ipv6 pool**, **ipv6 prefix**, **ipv6 route set**, **show crypto ssl authorization policy**, **show crypto ssl stats**.