
FIPS 140-2 Non Proprietary Security Policy
Level 2 Validation

Version 3.0
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1 Introduction

1.1 Purpose
This is a non-proprietary Cryptographic Module Security Policy for the Cisco ASA 5512-X, ASA 5515-X, ASA 5525-X, ASA 5545-X, ASA 5555-X, ASA 5580-20, ASA 5580-40, ASA 5585-X SSP-10, 5585-X SSP-20, 5585-X SSP-40 and 5585-X SSP-60 Series Adaptive Security Appliances running Firmware 9.1.7.9; referred to in this document as appliances. This security policy describes how the modules meet the security requirements of FIPS 140-2 Level 2 and how to run the modules in a FIPS 140-2 mode of operation and may be freely distributed.


1.2 Module Validation Level
The following table lists the level of validation for each area in the FIPS PUB 140-2.

<table>
<thead>
<tr>
<th>No.</th>
<th>Area Title</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cryptographic Module Specification</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Cryptographic Module Ports and Interfaces</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Roles, Services, and Authentication</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Finite State Model</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Physical Security</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Operational Environment</td>
<td>N/A</td>
</tr>
<tr>
<td>7</td>
<td>Cryptographic Key management</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Electromagnetic Interface/Electromagnetic Compatibility</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Self-Tests</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Design Assurance</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>Mitigation of Other Attacks</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 1 Module Validation Level

1.3 References
This document deals only with operations and capabilities of those Cisco ASA 5512-X, ASA 5515-X, ASA 5525-X, ASA 5545-X, ASA 5555-X, ASA 5580-20, ASA 5580-40, ASA 5585-X SSP-10, 5585-X SSP-20, 5585-X SSP-40 and 5585-X SSP-60 models listed above in section 1.2 in the technical terms of a FIPS 140-2 cryptographic module security policy. More information is available on the routers from the following sources:

The Cisco Systems website contains information on the full line of Cisco Systems security. Please refer to the following website:


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For answers to technical or sales related questions please refer to the contacts listed on the Cisco Systems website at www.cisco.com.

The NIST Validated Modules website (http://csrc.nist.gov/groups/STM/cmvp/validation.html) contains contact information for answers to technical or sales-related questions for the module.

1.4 Terminology
In this document, those Cisco ASA 5500 models identified above are referred to as ASA 5500 Security Appliances, Appliances or the systems.

1.5 Document Organization
The Security Policy document is part of the FIPS 140-2 Submission Package. In addition to this document, the Submission Package contains:

- Vendor Evidence document
- Finite State Machine
- Other supporting documentation as additional references

This document provides an overview of the Cisco ASA 5500 Security Appliances models identified in section 1.2 above and explains the secure configuration and operation of the module. This introduction section is followed by Section 2, which details the general features and functionality of the appliances. Section 3 specifically addresses the required configuration for the FIPS-mode of operation.

With the exception of this Non-Proprietary Security Policy, the FIPS 140-2 Validation Submission Documentation is Cisco-proprietary and is releasable only under appropriate non-disclosure agreements. For access to these documents, please contact Cisco Systems.
2  Cisco ASA 5500 Security Appliances

The Cisco ASA 5500 Security Appliances leverage Cisco's expertise in security and VPN solutions, and integrates the latest technologies from Cisco PIX 500 series security appliances, Cisco IPS 4200 Series Intrusion Prevention Systems, and Cisco VPN 3000 series concentrators. The following subsections describe the physical characteristics of the ASA 5500 appliances. Cisco ASA 5500 Series Adaptive Security Appliances integrate world-class firewall, unified communications security, VPN, IPS, and content security services in a unified platform.

2.1  ASA 5500 and Cryptographic Module Physical Characteristics

The Cisco ASA 5500 Security Appliances delivers enterprise-class security for medium business-to-enterprise networks in a modular, purpose-built appliance. Its versatile one-rack unit (1RU, 5512, 5515, 5525, 5545 and 5555), two-rack unit (2RU, ASA 5585-10, 5585-20, 5585-40 and 5585-60) and four-rack unit (4RU, ASA 5580-20 and 5580-40) design supports 10/100/1000 Gigabit Ethernet ports interfaces (on the ASA 5512, 5515, 5525, 5545 and 5555), 1 10/100 Fast Ethernet ports Management interface, and 4 10/100/1000 Gigabit Ethernet ports RJ45 interfaces, 4 Port Gigabit Ethernet ports fiber, and 2 10/100/1000 Gigabit Ethernet ports Management interface (on the ASA 5580 and ASA 5585-X) making it an excellent choice for businesses requiring a cost-effective, resilient security solution with demilitarized zone (DMZ) support.

The following subsections describe the physical characteristics of the Cisco ASA 5512-X, ASA 5515-X, ASA 5525-X, ASA 5545-X, ASA 5555-X, ASA 5580-20, ASA 5580-40, ASA 5585-X SSP-10, 5585-X SSP-20, 5585-X SSP-40 and 5585-X SSP-60 which contains a multiple-chip standalone cryptographic module with the cryptographic boundary defined as-the modules’ chassis along with the opacity shields. This module is used to support Remote Access VPN With TLSv1/DTLSv1 and IKEv2/ESPv3, Secure Shell SSHv2, Secure Sockets Layer (TLS/TLsv1), SNMPv3 and IKE v2 Site-to-Site VPN (with IKEv1 / ESPv1, IKEv2 / ESPv3 & manual keying) with Suite B. These protocols are acceptable under FIPS 140-2 but are non-compliant for SP 800-135.

2.2  Module Interfaces

The module provides a number of physical and logical interfaces to the device, and the physical interfaces provided by the module are mapped to the following FIPS 140-2 defined logical interfaces: data input, data output, control input, status output, and power. The module provided no power to external devices and takes in its power through normal power input/cord. The logical interfaces and their mapping are described in the following tables:
<table>
<thead>
<tr>
<th>FIPS 140-2 Logical Interface</th>
<th>ASA 5512, 5515, 5525, 5545, 5555 Physical Interface</th>
<th>ASA 55 Physical Interface</th>
<th>ASA 5585 Physical Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Input Interface</td>
<td>Ethernet ports MGMT Port Console Port</td>
<td>Ethernet ports MGMT Port Console Port</td>
<td>Ethernet ports MGMT Port Console Port</td>
</tr>
<tr>
<td>Data Output Interface</td>
<td>Ethernet ports MGMT Port Console Port</td>
<td>Ethernet ports MGMT Port Console Port</td>
<td>Ethernet ports MGMT Port Console Port</td>
</tr>
<tr>
<td>Control Input Interface</td>
<td>Ethernet ports MGMT Port Power Switch Console Port</td>
<td>Ethernet ports MGMT Port Console Port Reset Switch</td>
<td>Ethernet ports MGMT Port Console Port Reset Switch</td>
</tr>
<tr>
<td>Status Output Interface</td>
<td>Ethernet ports MGMT Port LEDs Console Port</td>
<td>Ethernet ports MGMT Port LEDs Console Port</td>
<td>Ethernet ports MGMT Port LEDs Console Port</td>
</tr>
<tr>
<td>Power Interface</td>
<td>Power Plug</td>
<td>Power Plug</td>
<td>Power Plug</td>
</tr>
<tr>
<td>Unused Interface</td>
<td>USB Port</td>
<td>USB Port</td>
<td>USB Port Aux Port</td>
</tr>
</tbody>
</table>

Table 2 Module Interfaces

Figure 1 – Cisco ASA 5512, 5515 and 5525 Series Security Appliance Front Panel
<table>
<thead>
<tr>
<th>LED</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1   | Power button: A hard switch that turns the system on and off. Once depressed, the button stays in the "on" position.  
- On: The power symbol on the button illuminates.  
- Off: The power symbol on the button is dark.  
For information about the power state, see the "Power Supply Considerations" section. |
| 2   | Hard disk release button: Releases the hard disk from the device. |
| 3   | Alarm: Indicates system operating status:  
- Off: Normal operating system function.  
- Flashing amber: Critical Alarm indicating one or more of the following:  
  - a major failure of a hardware or software component.  
  - an over-temperature condition.  
- Power voltage is outside of the tolerance range. |
| 4   | VPN: Indicates VPN tunnel status:  
- Solid green: VPN tunnel is established.  
- Off: No VPN tunnel is established. |
| 5   | HD: Indicates Hard Disk Drive status:  
- Flashing green: Proportioned to read/write activity.  
- Solid amber: Hard disk drive failure.  
- Off: No hard disk drive present. |
| 6   | PS: Indicates the power supply status. |
| 7   | Active: Indicates the status of the failover pair:  
- Solid green: Failover pair is operating normally.  
- Off: Failover is not operational. |
| 8   | Boot: Indicates power-up diagnostics:  
- Flashing green: Power-up diagnostics are running, or system is booting.  
- Solid green: System has passed power-up diagnostics.  
- Off: Power-up diagnostics are not operational. |

Figure 2 — ASA 5512, 5515 and 5525 Series Security Appliance Rear Panel

<table>
<thead>
<tr>
<th>LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management 0/0 interface: Indicates the Gigabit Ethernet interface that is restricted to management use only. Connect with an RJ-45 cable. (See the &quot;Management 0/0 Interface on the ASA 5500-X Series&quot; section.)</td>
</tr>
<tr>
<td>2</td>
<td>Power supply: Indicates the chassis power supply.</td>
</tr>
</tbody>
</table>
| 3   | RJ-45 ports: Indicates the Gigabit Ethernet customer data interfaces.  
The top row port numbers are (from left to right): 0, 3, 7.  
The bottom row port numbers are (from left to right): 4, 2, 0. |
| 4   | USB Ports: Indicates the two USB standard ports. (See the "External USB Support" section.) |
| 5   | Console port: Indicates the console port that directly connects a computer to the ASA. |
### Figure 3 – Cisco ASA 5545 Series Security Appliance Front Panel

<table>
<thead>
<tr>
<th>LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power button&lt;br&gt;A hard switch that turns the system on and off. Once depressed, the button stays in the “on” position.  &lt;br&gt;- On—The power symbol on the button illuminates.  &lt;br&gt;- Off—The power symbol on the button is dark.  &lt;br&gt;For information about the power state, see the “Power Supply Considerations” section.</td>
</tr>
<tr>
<td>2</td>
<td>Hard disk slot&lt;br&gt;Indicates the slot for hard disk 1.</td>
</tr>
<tr>
<td>3</td>
<td>Hard disk release button&lt;br&gt;Releases hard disk 1 from the device.</td>
</tr>
<tr>
<td>4</td>
<td>Hard disk release button&lt;br&gt;Releases hard disk 0 from the device.</td>
</tr>
<tr>
<td>5</td>
<td>Hard disk slot&lt;br&gt;Indicates the slot for hard disk 0.</td>
</tr>
<tr>
<td>6</td>
<td>Alarms&lt;br&gt;Indicates system operating status:  &lt;br&gt;- Flashing amber—Critical Alarm indicating one or more of the following:  &lt;br&gt;  - a major failure of a hardware or software component.  &lt;br&gt;  - an over-temperature condition.  &lt;br&gt;  - power voltage is outside of the tolerance range.</td>
</tr>
<tr>
<td>7</td>
<td>VPN&lt;br&gt;Indicates VPN tunnel status:  &lt;br&gt;- Solid green—VPN tunnel is established.  &lt;br&gt;- Off—No VPN tunnel is established.</td>
</tr>
<tr>
<td>8</td>
<td>HD1&lt;br&gt;Indicates Hard Disk Drive 1 status:  &lt;br&gt;- Flashing green—Proportioned to read/write activity.  &lt;br&gt;- Solid amber—Hard disk drive failure.  &lt;br&gt;- Off—No hard disk drive present.</td>
</tr>
<tr>
<td>9</td>
<td>HD0&lt;br&gt;Indicates Hard Disk Drive 0 status:  &lt;br&gt;- Flashing green—Proportioned to read/write activity.  &lt;br&gt;- Solid amber—Hard disk drive failure.  &lt;br&gt;- Off—No hard disk drive present.</td>
</tr>
<tr>
<td>10</td>
<td>PS1&lt;br&gt;Indicates the status of the optional redundant power supply.</td>
</tr>
<tr>
<td>11</td>
<td>PS0&lt;br&gt;Indicates the status of the primary power supply that ships with the product.</td>
</tr>
<tr>
<td>12</td>
<td>Active&lt;br&gt;Indicates the status of the failover pair:  &lt;br&gt;- Solid green—Failover pair is operating normally.  &lt;br&gt;- Off—Failover pair is not operational.</td>
</tr>
</tbody>
</table>
| 13  | Boot<br>Indicates power-up diagnostics:  <br>- Flashing green—Power-up diagnostics are running, or system is booting.  <br>- Solid green—System has passed power-up diagnostics.  <br>- Off—Power-up diagnostics are not operational.
<table>
<thead>
<tr>
<th>LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I/O slot</td>
</tr>
<tr>
<td>2</td>
<td>Thumb screw</td>
</tr>
<tr>
<td>3</td>
<td>Management I/O port</td>
</tr>
<tr>
<td>4</td>
<td>RJ-45 ports</td>
</tr>
<tr>
<td>5</td>
<td>Power supplies</td>
</tr>
<tr>
<td>6</td>
<td>USB ports</td>
</tr>
<tr>
<td>7</td>
<td>Console port</td>
</tr>
<tr>
<td>8</td>
<td>Rear panel LEDs</td>
</tr>
</tbody>
</table>

Figure 4 – Cisco ASA 5545 Series Security Appliance Rear Panel
Figure 5 – *Cisco ASA 5580 Series Security Appliance Front Panel*

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Active</td>
</tr>
<tr>
<td>2</td>
<td>System</td>
</tr>
<tr>
<td>3</td>
<td>Power Status</td>
</tr>
<tr>
<td>4</td>
<td>Management 0/0</td>
</tr>
<tr>
<td>5</td>
<td>Management 0/1</td>
</tr>
<tr>
<td>6</td>
<td>Power</td>
</tr>
</tbody>
</table>

Figure 6 – *Cisco ASA 5580 Series Security Appliance Rear Panel Indicators*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power Indicator</td>
</tr>
<tr>
<td>2</td>
<td>Link Indicator</td>
</tr>
<tr>
<td>3</td>
<td>Activity Indicator</td>
</tr>
</tbody>
</table>
**Figure 7 – Cisco ASA 5580 Series Security Appliance Rear Panel**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power Supply</td>
</tr>
<tr>
<td>2</td>
<td>Interface Expansion Slots</td>
</tr>
<tr>
<td>3</td>
<td>Power Supply</td>
</tr>
<tr>
<td>4</td>
<td>T-15 Torx Screwdriver</td>
</tr>
<tr>
<td>5</td>
<td>USB Ports</td>
</tr>
<tr>
<td>6</td>
<td>Reserved Slot</td>
</tr>
<tr>
<td>7</td>
<td>Example of Populated Slot</td>
</tr>
<tr>
<td>8</td>
<td>Reserved Slot</td>
</tr>
<tr>
<td>9</td>
<td>Console port</td>
</tr>
<tr>
<td>10</td>
<td>Management ports</td>
</tr>
</tbody>
</table>

**Figure 8 – Cisco ASA 5585-X SSP-10 and SSP-20 Series Security Appliance Front Panel**

1. IPS SSP
2. SSP
3. Reserved bays for hard-disk drives
4. Reserved bays for hard-disk drives
5. Ethernet ports (not present on SSP 10 or SSP 20)
6. Ethernet ports
7. Ethernet ports
8. Management
9. Ethernet ports (not present on SSP 10 or SSP 20)
10. USB port
11. USB port
12. Front panel indicators
13. Auxiliary port (RJ45)
14. Console port (RJ45)
15. Eject
16. Vent (on SSP 40 and SSP 60) and Ethernet ports (on SSP 10 or SSP 20)
2.3 Roles and Services

The security appliances can be accessed in one of the following ways:
  * Console Port
  * Telnet over IPSec
Authentication is identity-based. Each user is authenticated by the module upon initial access to the module. As required by FIPS 140-2, there are two roles in the security appliances that operators may assume: a Crypto Officer role and User role. The administrator of the security appliances assumes the Crypto Officer role in order to configure and maintain the router using Crypto Officer services, while the Users exercise only the basic User services. The module also supports RADIUS and TACACS+ as another means of authentication, allowing the storage of usernames and passwords on an external server as opposed to using the module’s internal database for storage.

The User and Crypto Officer passwords and all shared secrets must each be at least eight (8) characters long, including at least one letter and at least one number character, in length (enforced procedurally). See the Secure Operation section for more information. If six (6) integers, one (1) special character and one (1) alphabet are used without repetition for an eight (8) digit PIN, the probability of randomly guessing the correct sequence is one (1) in 251,596,800. This is calculated by performing 10 x 9 x 8 x 7 x 6 x 5 x 32 x 52. In order to successfully guess the sequence in one minute would require the ability to make over 4,193,280 guesses per second, which far exceeds the operational capabilities of the module. Including the rest of the alphanumeric characters drastically decreases the odds of guessing the correct sequence.

Additionally, when using RSA based authentication, RSA key pair has modulus size of 2048 bits to 4096 bits, thus providing between 112 bits and 224 bits of strength. Assuming the low end of that range, an attacker would have a 1 in $2^{112}$ chance of randomly obtaining the key, which is much stronger than the one in a million chance required by FIPS 140-2. To exceed a one in 100,000 probability of a successful random key guess in one minute, an attacker would have to be capable of approximately $1.8 \times 10^{21}$ attempts per minute, which far exceeds the operational capabilities of the modules to support.

The User and Crypto Officer passwords and all shared secrets must each be at least eight (8) characters long, including at least one letter and at least one number character, in length (enforced procedurally).

User Services

Users can access the system in two ways:

1. By accessing the console port with a terminal program or via IPSec protected telnet or SSH session to an Ethernet ports port. The IOS prompts the User for username and password. If the password is correct, the User is allowed entry to the IOS executive program.

2. Via an IPSec session. This session is authenticated either using a shared secret or RSA digital signature authentication mechanism.
The services available to the User role consist of the following (r=read, w=write, x=execute, z=zeroize):

<table>
<thead>
<tr>
<th>Services &amp; Access</th>
<th>Description</th>
<th>Keys &amp; CSPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status Functions (r)</td>
<td>Image version currently running, installed hardware components, and version of hardware installed.</td>
<td>User password</td>
</tr>
<tr>
<td>Network Functions (r, w, x)</td>
<td>Initiate diagnostic network services, such as ping.</td>
<td>User password</td>
</tr>
<tr>
<td>VPN functions (r, x)</td>
<td>Negotiation and encrypted data transport via VPN</td>
<td>ISAKMP pre-shared keys, IKE Authentication key, IKE Encryption Key, IPSec authentication keys, IPSec traffic keys, User passwords</td>
</tr>
<tr>
<td>Directory Services (r, x)</td>
<td>Display directory of files kept in flash memory.</td>
<td>User password</td>
</tr>
<tr>
<td>Perform Self-Tests (r, x)</td>
<td>Execute Known Answer Test on Algorithms within the cryptographic module.</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 3 - User Services

**Crypto Officer Services**

The Crypto Officer role is responsible for the configuration and maintenance of the security appliances and authenticates from the `enable` command (for local authentication) or the `login` command (for AAA authentication) from the user services. The Crypto Officer services consist of the following:

The Crypto Officer services consist of the following:

<table>
<thead>
<tr>
<th>Services &amp; Access</th>
<th>Description</th>
<th>Keys &amp; CSPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configure the Security Appliance (r, w, z)</td>
<td>Define network interfaces and settings; provide for the entry and output of CSPs; set the protocols the security appliances will support; enable interfaces and network services; set system date and time; load authentication information; and configure authentication servers, filters and access lists for interfaces and users, and privileges.</td>
<td>ISAKMP pre-shared keys, IKE Authentication key, IKE Encryption Key, IPSec authentication keys, IPSec traffic keys, Enable secret,</td>
</tr>
<tr>
<td>Define Rules and Filters (r, w, z)</td>
<td>Create packet Filters that are applied to User data streams on each interface. Each Filter consists of a set of Rules, which define a set of packets to permit or deny based on characteristics such as protocol ID, addresses, ports, TCP connection establishment, or packet direction.</td>
<td>password</td>
</tr>
<tr>
<td>View Status Functions (r, x)</td>
<td>View the configuration, routing tables, active sessions, use SNMP queries to view SNMP MIB statistics, health, temperature, memory status, packet statistics, review accounting logs, and view physical interface status.</td>
<td>password</td>
</tr>
<tr>
<td>Manage the Security Appliance (r, w, z)</td>
<td>Log off users, provide for the entry and output of CSPs, shutdown or reload the security appliances, view complete configurations, view full status, manage user rights, and restore configurations.</td>
<td>password</td>
</tr>
<tr>
<td>Set Encryption/Bypass (r, w, x, z)</td>
<td>Set up the configuration tables for IP tunneling. Set keys and algorithms to be used for each IP range or allow plain text packets to be sent from specified IP address. Set up site to site VPN for IPv6.</td>
<td>ISAKMP pre-shared keys, IKE Authentication key, IKE Encryption Key, IPSec authentication keys, IPSec traffic keys, Enable secret,</td>
</tr>
<tr>
<td>Perform Self-Tests (r, x)</td>
<td>Execute Known Answer Test on Algorithms within the cryptographic module.</td>
<td>N/A</td>
</tr>
<tr>
<td>SSL VPN (using TLSv1.0) (r, w, x, z)</td>
<td>Configure SSL VPN parameters, provide entry and output of CSPs.</td>
<td>TLS pre-master secret, TLS Traffic Keys</td>
</tr>
<tr>
<td>Local Certificate Authority (r, w, z)</td>
<td>Allows the ASA to be configured as a Root Certificate Authority and issue user certificates for SSL VPN use (AnyConnect and Clientless). The ASA can then be configured to require client certificates for authentication.</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 4 - Crypto Officer Services
2.4 Unauthenticated Services
The services available to unauthenticated users are:
- Viewing the status output from the module’s LEDs
- Powering the module on and off using the power switch on the third-party chassis
- Performing bypass service

2.5 Cryptographic Key Management

The ASA 5500 administers both cryptographic keys and other critical security parameters such as passwords. All keys and CSPs are protected by the password-protection on the Crypto Officer role login, and can be zeroized by the Crypto Officer. Zeroization consists of overwriting the memory that stored the key or refreshing the volatile memory. Keys are both manually and electronically distributed but entered electronically. Persistent keys with manual distribution are used for pre-shared keys whereas protocols such as IKE, TLS and SSH are used for electronic distribution.

The ASA 5500 module securely administers both cryptographic keys and other critical security parameters such as passwords. The tamper evidence seals provide physical protection for all keys. All pre-shared keys are associated with the CO role that created the keys, and the CO role is protected by a password. Therefore, the CO password is associated with all the pre-shared keys. The Crypto Officer needs to be authenticated to store keys. Only an authenticated Crypto Officer can view the keys. All Diffie-Hellman (DH) keys agreed upon for individual tunnels are directly associated with that specific tunnel only via the IKE protocol. RSA Public keys are entered into the modules using digital certificates which contain relevant data such as the name of the public key's owner, which associates the key with the correct entity. All other keys are associated with the user/role that entered them.

The module pulls in 32 bytes of entropy from a high-jitter free-running oscillators for use with the DRBG. This equates to greater than 112 bits of entropy.

<table>
<thead>
<tr>
<th>Key/CSP</th>
<th>Generation</th>
<th>Description</th>
<th>Storage</th>
<th>Zeroization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diffie-Hellman private exponent</td>
<td>Diffie-Hellman</td>
<td>Key agreement for IKE, TLS, and SSH sessions. Diffie-Hellman groups 1 (768 bits of keying strength), 2 (1024 bits), 5 (1536 bits) and 7 (2048 bits) are supported. Please note that groups 1, 2 and 5 are not to be used in FIPS mode. This key was generated by calling FIPS approved SP800-90a DRBG.</td>
<td>DRAM (plain text)</td>
<td>Automatically when session expires</td>
</tr>
<tr>
<td>Diffie-Hellman shared secret</td>
<td>Diffie-Hellman</td>
<td>This is the shared secret agreed upon as part of DH exchange. This key was generated by the module.</td>
<td>DRAM (plain text)</td>
<td>Automatically when session expires</td>
</tr>
<tr>
<td>Diffie-Hellman public exponent</td>
<td>Diffie-Hellman</td>
<td>Key agreement for IKE, TLS, and SSH sessions. Diffie-Hellman groups 1 (768 bits of keying strength), 2 (1024 bits), 5 (1536 bits) and 7</td>
<td>DRAM (plain text)</td>
<td>Automatically when session expires</td>
</tr>
</tbody>
</table>
RSA private keys | RSA 2048 | Identity certificates for the security appliance itself and also used in IPSec, TLS, and SSH negotiations. The security appliances support 512, 768, 1024 and 2048 bit key sizes (512, 768 and 1024-bit key lengths are not to be used in FIPS mode). This key was generated by calling FIPS approved SP800-90a DRBG | Private Key - NVRAM (plain text) | Zeroized by “#crypto key zeroize rsa”, write to startup config, followed by a module reboot

RSA public keys | RSA 2048 | Identity certificates for the security appliance itself and also used in IPSec, TLS, and SSH negotiations. The security appliances support 512, 768, 1024 and 2048 bit key sizes (512, 768 and 1024-bit key lengths are not to be used in FIPS mode). This key is generated by calling FIPS approved SP800-90a DRBG | Public Key - NVRAM (plain text) | Zeroized by “#crypto key zeroize rsa”, write to startup config, followed by a module reboot

skeyid | HMAC-SHA1/256/384/512 | Value derived from the shared secret within IKE exchange. | DRAM (plain text) | Automatically after IKE session is terminated

skeyid_d | HMAC-SHA1/256/384/512 | Value derived from the shared secret within IKE exchange. | DRAM (plain text) | Automatically after IKE session is terminated

ISAKMP pre-shared secret | Shared Secret | Used for authentication during IKE. This key was configured by Crypto Officer. | NVRAM (plain text) | Zeroized by “#erase flash:” command (or replacing), write to startup config, followed by a module reboot

IKE authentication key | HMAC-SHA1/256/384/512 | This key is used to authenticate IKE sessions. This key was derived in the module. | DRAM (plain text) | Automatically after IKE session is terminated or by resetting the appliances

IKE encryption key | Triple-Des/AES 128/192/256 | Used to encrypt IKE negotiations. This key was derived in the module. | DRAM (plain text) | Automatically after IKE session is terminated or by resetting the appliances

AES-GCM Encryption/decryption | AES-GCM 128/192/256 | Symmetric Cipher Encrypts data blocks while performing decrypt-on-the-fly verification Decrypts data block | DRAM (plain text) | AES keys are dynamically generated IAW the RFCs and are not persistent, the new keys are regenerated for any AES-GCM connection after power is removed and restored.

IPSec authentication key | HMAC-SHA1/256/384/512 | Exchanged using the IKE protocol and the public/private key pairs. These are Triple-DES or AES keys. This key was derived in | DRAM (plain text) | Automatically after IPSec session is terminated or by resetting the appliances
<table>
<thead>
<tr>
<th><strong>IPSec traffic keys</strong></th>
<th>Triple-Des/AES 128/192/256 HMAC-SHA1/256/384/512</th>
<th>Exchanged using the IKE protocol and the public/private key pairs. These are Triple-DES or AES keys. This key was derived in the module.</th>
<th>DRAM (plain text)</th>
<th>Automatically after IPSec session is terminated or by resetting the appliances</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RADIUS shared secret</strong></td>
<td>Shared Secret</td>
<td>Used for authenticating the RADIUS server to the security appliances and vice versa. This key was configured by Crypto Officer.</td>
<td>NVRAM (plain text)</td>
<td>Zeroized by “#erase flash:” command (or replacing), write to startup config, followed by a module reboot</td>
</tr>
<tr>
<td><strong>TACACS+ shared secret</strong></td>
<td>Shared Secret</td>
<td>Used for authenticating the TACACS+ server to the security appliances and vice versa. This key was configured by Crypto Officer.</td>
<td>NVRAM (plain text)</td>
<td>Zeroized by “#erase flash:” command (or replacing), write to startup config, followed by a module reboot</td>
</tr>
<tr>
<td><strong>User password</strong></td>
<td>Shared Secret</td>
<td>Critical security parameters used to authenticate the User/Crypto-Officer login. This key was configured by Crypto Officer.</td>
<td>NVRAM (plaintext)</td>
<td>Overwrite with new password</td>
</tr>
<tr>
<td><strong>Enable password</strong></td>
<td>Shared Secret</td>
<td>Configured by Crypto Officer. It is used to authenticate Crypto officer.</td>
<td>NVRAM (plaintext)</td>
<td>Overwrite with new password</td>
</tr>
<tr>
<td><strong>Enable secret</strong></td>
<td>Shared Secret</td>
<td>Configured by Crypto Officer. It is used to authenticate Crypto officer role.</td>
<td>NVRAM (plaintext)</td>
<td>Overwrite with new password</td>
</tr>
<tr>
<td><strong>TLS pre-master secret</strong></td>
<td>Shared Secret</td>
<td>Shared secret created/derived using asymmetric cryptography from which new HTTPS session keys can be created. This key entered into the module in cipher text form, encrypted by RSA public key.</td>
<td>DRAM (plaintext)</td>
<td>Automatically when TLS session is terminated.</td>
</tr>
<tr>
<td><strong>TLS traffic keys</strong></td>
<td>Triple-DES/AES 128/192/256 HMAC-SHA1/256/384/512</td>
<td>Used in HTTPS connections. Generated using TLS protocol. This key was derived in the module.</td>
<td>DRAM (plain text)</td>
<td>Automatically when TLS session is terminated</td>
</tr>
<tr>
<td><strong>SSH v2 authentication keys</strong></td>
<td>HMAC-SHA1/256/384/512</td>
<td>This key is used to perform the authentication between the SSH client and SSH server. This key was derived in the module.</td>
<td>DRAM (plain text)</td>
<td>Zeroized automatically when SSH session is closed</td>
</tr>
<tr>
<td><strong>SSH v2 session encryption keys</strong></td>
<td>Triple-Des/AES 128/192/256</td>
<td>This is the symmetric SSH key used to protect SSH session. This key was derived in the module.</td>
<td>DRAM (plain text)</td>
<td>Zeroized automatically when SSH session is closed</td>
</tr>
<tr>
<td><strong>ECDSA private key</strong></td>
<td>ECDSA P-256,384,521</td>
<td>Key pair generation, signature generation/verification</td>
<td>DRAM</td>
<td>Zeroized upon API call “#crypto key zeroize eccsas”</td>
</tr>
<tr>
<td><strong>ECDSA public key</strong></td>
<td>ECDSA P-256,384,521</td>
<td>Key pair generation, signature generation/verification</td>
<td>DRAM</td>
<td>Zeroized upon API call “#crypto key zeroize eccsas”</td>
</tr>
</tbody>
</table>
Table 5 Cryptographic Keys and CSPs

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DRBG Seed</td>
<td>SHA-512 Hash DRBG</td>
<td>This is the internal value generated by the module and used in the DRBG</td>
<td>DRAM</td>
</tr>
<tr>
<td>DRBG V value</td>
<td>SHA-512 Hash DRBG</td>
<td>This is the internal value generated by the module and used in the DRBG</td>
<td>DRAM</td>
</tr>
<tr>
<td>DRBG C value</td>
<td>SHA-512 Hash DRBG</td>
<td>This is the internal value generated by the module and used in the DRBG</td>
<td>DRAM</td>
</tr>
</tbody>
</table>

2.6 Cryptographic Algorithms

The module implements a variety of approved and non-approved algorithms.

Approved Cryptographic Algorithms

The routers support the following FIPS-2 approved algorithm implementations:

<table>
<thead>
<tr>
<th>Algorithms</th>
<th>Algorithm Certificate Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>AES</td>
<td>ASA CN1610, ASA CN1520, ASA CN1620</td>
</tr>
<tr>
<td>Triple-DES</td>
<td>2483, 2482, 2472, 1407 &amp; 2480, 2050 &amp; 2444</td>
</tr>
<tr>
<td>SHA</td>
<td>1521, 1520, 1513, 960, 1321</td>
</tr>
<tr>
<td>HMAC</td>
<td>2101, 2100, 2091, 1793, 1794</td>
</tr>
<tr>
<td>RSA</td>
<td>1525, 1524, 1514, 1246, 1247</td>
</tr>
<tr>
<td>ECDSA</td>
<td>1272, 1271, 1260, 1269, 1066</td>
</tr>
<tr>
<td>DRBG</td>
<td>412, 411, 341, 336, 339, 332</td>
</tr>
</tbody>
</table>

Table 6 Approved Cryptographic Algorithms

Non-FIPS Approved Algorithms Allowed in FIPS Mode

The module supports the following non-FIPS approved algorithms which are permitted for use in the FIPS approved mode:

- Diffie-Hellman (key agreement; key establishment methodology provides 112 bits of encryption strength; non-compliant less than 112 bits of encryption strength)
- RSA (key wrapping; key establishment methodology provides 112 bits of encryption strength; non-compliant less than 112 bits of encryption strength)

Non-Approved Cryptographic Algorithms

The module supports the following non-approved cryptographic algorithms that shall not be used in FIPS mode of operation:

- DES
- HMAC MD5
- MD5\(^1\)
- NDRNG
- RC4
- RNG
- HMAC-SHA1 is not allowed with key size under 112-bits
- RSA (Cert. #106; non-compliant with the functions from the CAVP Historical RSA list)
  - FIPS186-2:
    ALG[RSASSA-PKCS1_V1_5]: SIG(gen): 1024, 2048, SHS: SHA-1
- RSA (Cert. #261; non-compliant with the functions from the CAVP Historical RSA list)
  - FIPS186-2:
    ALG[RSASSA-PKCS1_V1_5]: SIG(gen): 1024, 2048, SHS: SHA-1
- RSA (Cert. #1066; non-compliant with the functions from the CAVP Historical RSA list)
  - FIPS186-2:
    ALG[RSASSA-PKCS1_V1_5]: SIG(gen): 1024, SHS: SHA-1, SHA-256, SHA-384, SHA-512, 2048, SHS: SHA-1
- RSA (Cert. #1260; non-compliant with the functions from the CAVP Historical RSA list)
  - FIPS186-2:
    ALG[RSASSA-PKCS1_V1_5]: SIG(gen): 1024, SHS: SHA-1, SHA-256, SHA-384, SHA-512, 2048, 4096, SHS: SHA-1
- RSA (Cert. #1269; non-compliant with the functions from the CAVP Historical RSA list)
  - FIPS186-2:
    ALG[RSASSA-PKCS1_V1_5]: SIG(gen): 1024, SHS: SHA-1, SHA-256, SHA-384, SHA-512, 2048, SHS: SHA-1
- RSA (Cert. #1271; non-compliant with the functions from the CAVP Historical RSA list)
  - FIPS186-2:
    ALG[ANSIX9.31]: Key(gen)(MOD: 1024 PubKey Values: 65537
    ALG[RSASSA-PKCS1_V1_5]: SIG(gen): 1024, SHS: SHA-1, SHA-256, SHA-384, SHA-512, 2048, 4096, SHS: SHA-1

\(^1\) Allowed in FIPS mode

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• RSA (Cert. #1272; non-compliant with the functions from the CAVP Historical RSA list)
  - FIPS186-2:
    ALG[ANSIX9.31]: Key(gen)(MOD: 1024 PubKey Values: 65537
    ALG[RSASSA-PKCS1_V1_5]: SIG(gen): 1024 , SHS: SHA-1, SHA-256, SHA-384,
    SHA-512, 2048 , SHS: SHA-1

2.7 Self-Tests
The modules include an array of self-tests that are run during startup and periodically during operations to
prevent any secure data from being released and to insure all components are functioning correctly.

Self-tests performed
• ASA Self Tests
  o POSTs – Adaptive Security Appliance OS (Firmware)
    • AES GCM KAT
    • AES Encrypt/Decrypt KATs
    • DRBG KAT
    • ECDSA
    • Firmware Integrity Test (using SHA-512)
    • HMAC-SHA-1 KAT
    • HMAC-SHA-256 KAT
    • HMAC-SHA-384 KAT
    • HMAC-SHA-512 KAT
    • RSA KAT
    • SHA-1 KAT
    • SHA-256 KAT
    • SHA–384 KAT
    • SHA-512 KAT
    • Triple-DES Encrypt/Decrypt KATs
  o POSTs – ASA On-board (Hardware)
    • AES Encrypt/Decrypt KATs
    • DRBG KAT
    • HMAC-SHA-1 KAT
    • HMAC-SHA-256 KAT (5580 and 5585 models only)
    • HMAC-SHA-384 KAT (5580 and 5585 models only)
    • HMAC-SHA-512 KAT (5580 and 5585 models only)
    • RSA KAT
    • SHA-1 KAT
    • SHA-256 KAT (5580 and 5585 models only)
    • SHA-384 KAT (5580 and 5585 models only)
    • SHA-512 KAT (5580 and 5585 models only)
• Triple-DES Encrypt/Decrypt KATs
  o Conditional tests - Adaptive Security Appliance OS (Firmware)
    ▪ RSA pairwise consistency test (encrypt/decrypt and sign/verify)
    ▪ ECDSA pairwise consistency test
    ▪ Conditional Bypass test
    ▪ Continuous random number generation test for FIPS approved and non-approved RNG
  o Conditional tests - ASA On-board (Hardware)
    ▪ RSA pairwise consistency test (encrypt/decrypt and sign/verify)
    ▪ Continuous random number generation test for FIPS approved SP 800-90a DRBG

The security appliances perform all power-on self-tests automatically at boot when FIPS mode is enabled. All power-on self-tests must be passed before a User/Crypto Officer can perform services. The power-on self-tests are performed after the cryptographic systems are initialized but prior to the initialization of the LAN’s interfaces; this prevents the security appliances from passing any data during a power-on self-test failure. In the unlikely event that a power-on self-test fails, an error message is displayed on the console followed by a security appliance reboot.

2.8 Physical Security
The FIPS 140-2 level 2 physical security requirements for the modules are met by the use of opacity shields covering the front panels of modules to provide the required opacity and tamper evident seals to provide the required tamper evidence. The following sections illustrate the physical security provided by the module.

The following table shows the tamper labels and opacity shields that shall be installed on the modules to operate in a FIPS approved mode of operation. The CO is responsible for using, securing and having control at all times of any unused tamper evident labels. Actions to be taken when any evidence of tampering should be addressed within site security program.

<table>
<thead>
<tr>
<th>Model</th>
<th>Number</th>
<th>Tamper Evident Labels</th>
<th>Number</th>
<th>Opacity Shields</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tamper labels</td>
<td></td>
<td>Opacity Shields</td>
<td></td>
</tr>
<tr>
<td>5580</td>
<td>17</td>
<td>ASA5580-FIPS-KIT</td>
<td>2</td>
<td>ASA5580-FIPS-KIT</td>
</tr>
<tr>
<td>5585-X</td>
<td>8</td>
<td>ASA5585-X-FIPS-KIT</td>
<td>1</td>
<td>ASA5585-X-FIPS-KIT</td>
</tr>
</tbody>
</table>

Table 7 – Tamper/Opacity
ASA 5580-20 and 5580-40 Opacity Shield

To install an opacity shield on the ASA 5580 front and rear, follow these steps:

Step 1: Power off the ASA.

Step 2: Copy the ASA 5580 serial number on a label and stick it on the chassis where it can be retrieved easily for future use.

Step 3: Release the latches on the lever.

Step 4: Lower the handle, and pull the module out of the ASA until the release latches catch.

Step 5: Remove the five screws from the top and four screws on the sides of the front shield assembly. Keep the screws in a secure place for later use.

Step 6: Clean the chassis of any grease, dirt or oil with alcohol where the self-adhesive tape will stick on the chassis.

Step 7: Place the front surround panel over the front of the module so that the roller balls on the top of the module are visible through the matching openings on the surround panel.

Step 8: Remove the tape backing from the self-adhesive tape.

Step 9: Press down the self-adhesive tape to make sure the front surround panel is firmly stuck to the chassis.

Step 10: Push the module back into the chassis and use the handle to lock the module into place.

Step 11: Install the front panel inside the front surround panel and secure it with the nine screws you removed in Step 5.

Figure 13 – ASA 5580 Front Opacity Shield Placement
ASA 5585-X Opacity Shield

Step 1: Position the rear shield assembly on the rear of the chassis and align the rear shield panel holes with the holes on the rear of the chassis.

Step 2: Secure the shield into place using the screws provided in the kit

Step 3: Connect the power source and power on the chassis.

To install an opacity shield on the ASA 5585-X, follow these steps:
Step 1: Power off the ASA.

If you have not installed the cable management brackets, you can do it now. The cable management brackets will make it easier to manage all your cables.

Step 2: Position the cable management brackets on the front side of the ASA, and line up the bracket screws with the screw holes on the ASA.

Step 3: Tighten the screws in to the rack.

Step 4: Screw the rods to the holes above the cable management brackets.

Step 5: Place the FIPS opacity shield over the rods, align the holes on the FIPS opacity shield with the holes on the rods.

Step 6: Tighten the screws.
Figure 15 – ASA 5585-X Front Opacity Shield Placement
Tamper Evidence Labels (TELs)

Once the module has been configured to meet overall FIPS 140-2 Level 2 requirements, the module cannot be accessed without signs of tampering. The CO shall inspect for signs of tampering periodically.

To seal the system, apply tamper-evidence labels as depicted in the figures below.

ASA 5512-X and 5515-X

![Figure 16 Cisco ASA5512-X and ASA5515-X Front](image)

**Management and non-functional ports**

**Ethernet ports**

![Figure 17 Cisco ASA5512-X and ASA5515-X Rear](image)

ASA 5525-X and 5545-X

![Figure 18 Cisco ASA5525 Front](image)

**Ethernet ports**

**Management and Non-functional ports**

**Ethernet ports**
ASA 5580

Apply the 17 tamper evident labels as follows:
ASA 5585-X

Apply the 8 tamper evident labels as follows:

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Figure 26 Cisco ASA 5585 Security Appliance (Rear Face)

Figure 27 Cisco ASA 5585 Security Appliance (Front, top and right side)

Figure 28 Cisco ASA 5585 Security Appliance with Tamper Evident Label Placement (Bottom Face)

Figure 29 Cisco ASA 5585 Security Appliance with Tamper Evident Label Placement (Left Face)
Appling Tamper Evidence Labels

Step 1: Turn off and unplug the system before cleaning the chassis and applying labels.

Step 2: Clean the chassis of any grease, dirt, or oil before applying the tamper evident labels. Alcohol-based cleaning pads are recommended for this purpose.

Step 3: Apply a label to cover the security appliance as shown in figures above.

The tamper evident seals are produced from a special thin gauge vinyl with self-adhesive backing. Any attempt to open the device will damage the tamper evident seals or the material of the security appliance cover. Because the tamper evident seals have non-repeated serial numbers, they may be inspected for damage and compared against the applied serial numbers to verify that the security appliance has not been tampered with. Tamper evident seals can also be inspected for signs of tampering, which include the following: curled corners, rips, and slices. The word “OPEN” may appear if the label was peeled back.

3 Secure Operation

The module meets all the Level 2 requirements for FIPS 140-2. The module is shipped only to authorized operators by the vendor, and the modules are shipped in Cisco boxes with Cisco adhesive. Follow the setting instructions provided below to place the module in FIPS-approved mode. Operating this router without maintaining the following settings will remove the module from the FIPS approved mode of operation.

3.1 Crypto Officer Guidance - System Initialization

The Cisco ASA 5500 series security appliances were validated with adaptive security appliance firmware version 9.1.7.9 (file name: asa917-9-smp-k8.bin) for 5512-X, 5515-X, 5525-X, 5545-X, 5555-X, 5580-20, 5580-40, 5585-X SSP-10, 5585-X SSP-20, 5585-X SSP-40 and 5585-X SSP-60. These are the only allowable images for FIPS-approved mode of operation.

The Crypto Officer must configure and enforce the following initialization steps:

Step 1: Disable the console output of system crash information, using the following command:
(config)#crashinfo console disable

Step 2: Install Triple-DES/AES licenses to require the security appliances to use Triple-DES and AES (for data traffic and SSH).

Step 3: Enable “FIPS Mode” to allow the security appliances to internally enforce FIPS-compliant behavior, such as run power-on self-tests and bypass test, using the following command:
(config)#fips enable

Step 4: Disable password recovery.
Step 5: Set the configuration register to bypass ROMMON prompt at boot.

```
(config)#no service password-recovery
```

Step 6: If using a Radius/TACACS+ server for authentication, perform the following steps.(see Operator manual for specific TACACS+ commands) Otherwise, skip to step 7

```
(config)# config-register 0x10011
(config)# aaa-server radius-server protocol radius
(config)# aaa-server radius-server host <IP-address>
```

Configure an IPsec tunnel to secure traffic between the ASA and the Radius server. The pre-shared key must be at least 8 characters long.

Step 7: Enable AAA **authentication** for the console.

```
(config)# aaa authentication serial console LOCAL
(config)# username <name> password <password>
```

Step 8: Enable AAA **authentication** for SSH.

```
(config)# aaa authentication ssh console LOCAL
```

Step 9: Enable AAA **authentication** for Enable mode.

```
(config)# aaa authentication enable console LOCAL
```

Step 10: Specify Privilege Level 15 for Crypto Officer and Privilege Level 1 for User and set up username/password for each role.

```
(config)# username <name> password <password> privilege 15
(config)# username <name> password <password> privilege 1
```

Step 11: Ensure passwords are at least 8 characters long.

Step 12: All default passwords, such as enable and telnet, must be replaced with new passwords.

Step 13: Apply tamper evident labels as described in the “Physical Security” section on page 17.

Step 14: Reboot the security appliances.

3.2 Crypto Officer Guidance - System Configuration

To operate in FIPS mode, the Crypto Officer must perform the following steps:

Step 1: Assign users a Privilege Level of 1.

Step 2: Define RADIUS and TACACS+ shared secret keys that are at least 8 characters long and secure traffic between the security appliances and the RADIUS/TACACS+ server via IPSec tunnel.
Note: Perform this step only if RADIUS/TACAS+ is configured, otherwise proceed to step 3.

Step 3: Configure the TLS protocol when using HTTPS to protect administrative functions. Due to known issues relating to the use of TLS with certain versions of the Java plugin, we require that you upgrade to JRE 1.5.0_05 or later. The following configuration settings are known to work when launching ASDM in a TLS-only environment with JRE 1.5.0_05:
   a. Configure the device to allow only TLSv1 packets using the following command:
      (config)# ssl server-version tlsv1-only
      (config)# ssl client-version tlsv1-only
   b. Uncheck SSL Version 2.0 in both the web browser and JRE security settings.
   c. Check TLS V1.0 in both the web browser and JRE security settings.

Step 4: Configure the security appliances to use SSHv2. Note that all operators must still authenticate after remote access is granted.
   (config)# ssh version 2

Step 5: Configure the security appliances such that any remote connections via Telnet are secured through IPSec.

Step 6: Configure the security appliances such that only FIPS-approved algorithms are used for IPSec tunnels.

Step 7: Configure the security appliances such that error messages can only be viewed by Crypto Officer.

Step 8: Configure SNMP to always use a secure IPSec tunnel.

Step 9: Disable the TFTP server.

Step 10: Disable HTTP for performing system management in FIPS mode of operation. HTTPS with TLS should always be used for Web-based management.

Step 11: Ensure that installed digital certificates are signed using FIPS approved algorithms.

Step 12: Ensure that the 512-bit and 768-bit RSA keys are not used.

Step 13: Ensure that DH Group 1 (768-bits) keys are not used.

3.3 Identifying Router Operation in an Approved Mode
The following activities are required to verify that the module is operating in an Approved mode of operation.

1. Verify that the tamper evidence labels and FIPS opacity shields have been properly placed on the module based on the instructions specified in the “Physical Security” and “Secure Operation” sections of this document.
2. Verify that the length of User and Crypto Officer passwords and all shared secrets are at least eight (8) characters long, include at least one letter, and include at least one number character, as specified in the “Secure Operation” section of this document.

3. Issue the following commands: 'show crypto IPSec sa' and 'show crypto isakmp policy' to verify that only FIPS approved algorithms are used.
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