

# *FIPS 140-2 SECURITY POLICY*

## *Juniper Networks*

### *SSG 5 and SSG 20*

*HW P/N SSG-5 and SSG-20, FW Version ScreenOS 5.4.0r4*

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The following information is for FCC compliance of Class A devices: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

The following information is for FCC compliance of Class B devices: The equipment described in this manual generates and may radiate radio-frequency energy. If it is not installed in accordance with NetScreen's installation instructions, it may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in part 15 of the FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Consult the dealer or an experienced radio/TV technician for help.

- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

**Caution:** Changes or modifications to this product could void the user's warranty and authority to operate this device.

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## A. Scope of Document

The Juniper Networks Secure Services Gateway (SSG) 5 and SSG 20 are Internet security devices that integrate firewall, virtual private networking (VPN), and traffic shaping functions.

Through the VPN, the SSG 5 and SSG 20 provides the following:

- IPSec standard security
- Triple-DES and Advanced Encryption Standard (AES) key management
- Manual and automated IKE
- Use of RSA and DSA certificates

The SSG 5 and SSG 20 provide an interface for an operator to configure or set policies through the Console or Network ports. For initial configuration, the operator must directly connect a VT-100 terminal or a non-networked device that can emulate a VT-100 terminal to the Console port via a serial cable.

The general components of the SSG 5 and SSG 20 include firmware and hardware. The main hardware components consist of a main processor, memory, flash, 10/100 Mbps Ethernet interface, console interface and power supply. The entire case is defined as the cryptographic boundary of the module. The SSG 5 and 20's physical configuration is defined as a multi-chip standalone module.

**NOTE:** Unless explicitly stated otherwise, the text that follows applies to both the SSG 5 and SSG 20.

## B. Security Level

The SSG 5 and SSG 20 meets the overall requirements applicable to Level 2 security of FIPS 140-2.

**Table 1: Module Security Level Specification**

| Security Requirements Section             | Level |
|---|-------|
| Cryptographic Module Specification        | 3     |
| Cryptographic Module Ports and Interfaces | 2     |
| Roles, Services, and Authentication       | 2     |
| Finite State Model                        | 2     |
| Physical Security                         | 2     |
| Operational Environment                   | N/A   |
| Cryptographic Key Management              | 2     |
| EMI/EMC                                   | 3     |
| Self-Tests                                | 2     |
| Design Assurance                          | 2     |
| Mitigation of Other Attacks               | N/A   |

## C. Roles and Services

The SSG 5 and SSG 20 support three distinct roles:

- **Cryptographic Officer Role (Root):** The module allows one Crypto-Officer. This role is assigned to the first operator who logs on to the module using the default user name and password. Only the Crypto-Officer can create other administrators, and change FIPS mode.
- **User Role (Admin):** This role can configure specific security policies. These policies provide the module with information on how to operate (for example, configure access policies and VPN encryption with Triple-DES). This role does not have the ability to create other administrators.
- **Read-Only User Role (Admin):** This role can only perform a limited set of services to retrieve information or status. This role cannot perform services to configure the box.

The module allows concurrent Admin users, either User or Read-Only User roles.

The SSG 5 and SSG 20 provide the following services for each role:

**Table 2: Roles and services summary**

| Service  | Cryptographic Officer | User | Read-only User |
|--|-----------------------|------|----------------|
| <b>Clear/Delete:</b> Clear dynamic system info   | Y                     | Y    | N              |
| <b>Exec:</b> Exec system commands  | Y                     | Y    | N              |
| <b>Exit:</b> Exit command console  | Y                     | Y    | Y              |
| <b>Get (Show Status):</b> Get system information   | Y                     | Y    | Y              |
| <b>Ping:</b> Ping other host   | Y                     | Y    | Y              |
| <b>Reset (Self-Tests):</b> Reset system  | Y                     | Y    | N              |
| <b>Save:</b> Save command  | Y                     | Y    | N              |
| <b>Set:</b> Configure system parameters, including encryption, decryption and digital signatures | Y                     | Y    | N              |
| <b>Trace-route:</b> Trace route  | Y                     | Y    | N              |
| <b>Unset:</b> Unconfigure system parameters  | Y                     | Y    | N              |

The SSG 5 and 20 support both role-based and identity-based authentication.

- All roles can be authenticated locally (within the SSGs); optionally, the module supports

authentication via a RADIUS server for only the User role. Authentication by use of the RADIUS server is viewed as role-based authentication; all other methods of authentication are identity-based.

- All other forms of authentication (local database) are classified as identity-based.
- The module supports identity-based authentication for the Cryptographic Officer Role (local database), the User Role (local database), and the Read-Only Role (local database).
- User names and passwords are case-sensitive. The password consists of at least six alphanumeric characters. Since there are 26 uppercase letters, 26 lowercase letters, and 10 digits, the total number of available characters is 62. The probability of someone guessing a password is  $1/(62^6) = 1/56,800,235,584$ , which is far less than a 1/1,000,000 random success rate. If three login attempts from the console fail consecutively, the console will be disabled for one minute. If three login attempts from Telnet or the WebUI (through VPN with AES encryption) fail consecutively, any login attempts from that source will be dropped for one minute.
- If there are multiple login failure retries within one minute and since the user is locked out after three contiguous login failures, the random success rate for multiple retries is  $1/(62^6) + 1/(62^6) + 1/(62^6) = 3/(62^6)$ , which is far less than 1/100,000.
- In order for authentication data to be protected against disclosure, substitution and modification, passwords are not echoed during entry.
- The SSG series enforce both identity-based and role-based authentication. Based on their identity, the operator assumes the correct role.
- Operators must be authenticated using user names and passwords. Authentication will occur locally. As an option, the user can be authenticated via a RADIUS server. The RADIUS server provides an external database for user role administrators. The SSG acts as a RADIUS proxy, forwarding the authentication request to the RADIUS server. The RADIUS server replies with either an accept or reject message. See the log for authenticated logins. The RADIUS shared secret must be at least six characters.
- All logins through a TCP connection disconnect upon three consecutive login failures and an alarm is logged.

## D. Interfaces

The SSG 5 and SSG 20 provide a number of interfaces:

- The SSG 5 has seven Ethernet autosensing interfaces (RJ-45); the SSG 20 has four Ethernet interfaces. (Data Input, Data Output, Control, Status). These interfaces are network ports. Each port has two LEDs that indicate port status:
  - The right LED indicates the link status. If the LED is on, this means the link is up. If the LED is off, this means the link is down.
  - The left LED indicates the ethernet activity. If the LED is on and is blinking, this means the port is active (transmitting/receiving data). If the LED is off, this means the port is inactive
- Console port – RJ-45 serial port connector (Data Input, Data Output, Status, Control). This port allows initial access to the Command Line Interface (CLI).
- Modem port – RJ-45 serial port connector. Disabled in FIPS mode.
- USB port. Disabled in FIPS mode.
- Power interface: AC or DC.
- The SSG 5 and 20 have four status LEDs. Two LEDs are common to both:

**Table 3: Common LEDs to SSG 5 and SSG 20**

| Name   | Color | State       | Description  |
|--------|-------|-------------|--|
| Power  | Green | On steadily | Indicates that the unit is receiving power                       |
|        |       | Off         | Indicates that the unit is not receiving power                   |
| Status | Green | On steadily | Indicates that the system is starting or performing diagnostics. |
|        |       | Blinking    | Indicates that the device is operating normally.                 |
|        | Red   | Blinking    | Indicates that there was an error detected                       |

The SSG 5 has two LEDs that indicate the status of the optional WAN link:

**Table 4: SSG 5 WAN link status LEDs**

| Type | Name  | Color | State       | Description   |
|------|-------|-------|-------------|---|
| ISDN | CH B1 | Green | On steadily | Indicates that B-Channel 1 is active                  |
|      |       |       | Off         | Indicates that B-Channel 1 is not active              |
|      | CH B2 | Green | On steadily | Indicates that B-Channel 2 is active                  |
|      |       |       | Off         | Indicates that B-Channel 2 is not active              |
| V.92 | HOOK  | Green | On steadily | Indicates that the link is active.                    |
|      |       |       | Off         | Indicates that the serial interface is not in Service |
|      | TX/RX | Green | Blinking    | Indicates that traffic is                             |

|  |  |   |     |   |
|--|--|---|-----|---|
|  |  | n |     | passing through                               |
|  |  |   | Off | Indicates that no traffic is passing through. |

The SSG 20 has two LEDs that indicate the status of the optional PIMs:

**Table 5: SSG-20 mini PIM link status LEDs**

| Name  | Color | State       | Description                                     |
|-------|-------|-------------|---|
| PIM 1 | Green | On steadily | Indicates that the mini PIM is functioning      |
|       |       | Blinking    | Indicates that the mini PIMN is passing traffic |
|       |       | Off         | Indicates that the mini PIM is not operational. |
| PIM 2 | Green | On steadily | Indicates that the mini PIM is functioning      |
|       |       | Blinking    | Indicates that the mini PIMN is passing traffic |
|       |       | Off         | Indicates that the mini PIM is not operational. |

- Hardware reset button: After the user follows this sequence—press for 5 seconds, release for 5 seconds, press again for 5 seconds, and release again for 5 seconds—the device erases all configurations and restores the default factory settings (Control Input).
- The SSG 20 has two mini physical interface module (PIM) slots that may be populated with any of the following mini PIMs:
  - ISDN BRI
  - T1
  - E1
  - V.92
  - ADSL2/2+ Annex A
  - ADSL2/2+ Annex B
- A mini PIM may have two or three status LEDs, whose meaning is described in the following table:

**Table 6: SSG-20 mini PIM status LEDs**

| Type                      | Name  | Color | State       | Description                                  |
|---------------------------|-------|-------|-------------|--|
| ADSL 2/2+ (Annex A and B) | SYNC  | Green | On steadily | Indicates that the ADSL interface is trained |
|                           |       |       | Blinking    | Indicates training is in progress            |
|                           |       |       | Off         | Indicates that the interface is idle         |
|                           | TX/RX | Green | Blinking    | Indicates that traffic is passing through    |
|                           |       |       | Off         | Indicates that no traffic is passing through |
| ISDN BRI                  | CH B1 | Green | On          | Indicates that B-                            |



|       |           |        |             |   |
|-------|-----------|--------|-------------|---|
|       |           |        | steadily    | Channel 1 is active   |
|       |           |        | Off         | Indicates that B-Channel 1 is not active  |
|       | CH B2     | Green  | On steadily | Indicates that B-Channel 2 is active  |
|       |           |        | Off         | Indicates that B-Channel 2 is not active  |
| T1/E1 | ALARM     | Yellow | On steadily | Indicates that there is a local or remote alarm; device has detected a failure                                  |
|       |           |        | Off         | Indicates that there are no alarms or failures  |
|       | LOOP BACK | Yellow | On steadily | Indicates that a loopback or line state is detected   |
|       |           |        | Off         | Indicates that the loopback is not active   |
|       | CD        | Green  | On steadily | Indicates a carrier was detected and the internal DSU/CSU in the mini PIM is communicating with another DSU/CSU |
|       |           |        | Off         | Indicates that carrier detect is not active   |
|       | TX/RX     | Green  | Blinking    | Indicates that traffic is passing through   |
|       |           |        | Off         | Indicates that no traffic is passing through.   |

## E. Setting FIPS Mode

By default, the module is in non-FIPS mode on the first power-up.

Prior to placing the device in FIPS mode, the administrator must load the Juniper firmware authentication DSA public key, **imagekey.cer**, using the **save image-key** CLI command. When this public key is present on the device, the integrity and authenticity of the firmware is checked at system start and when firmware is loaded. If the DSA signature appended to the firmware is verified, the device allows it to be loaded.

If the device is not already running a FIPS validated version of the firmware, the administrator should load it using the **save software** CLI command. Loading a new version of firmware completely replaces any existing firmware.

Enable FIPS mode using the **set FIPS-mode enable** command. The module is automatically zeroized when toggling between FIPS and non-FIPS modes of operation, which resets the configuration back to factory default values and restarts the module. It is suggested that the module's configuration be saved prior to switching modes.

To check whether the device is in FIPS mode, enter the **get system** CLI command:

```
ns-> get system
Product Name: SSG 5
Serial Number: 0099122004000991, Control Number: 00000000, Mode: FIPS
Hardware Version: 0110(0)-(12), FPGA checksum: 00000000, VLAN1 IP (0.0.0.0)
Software Version: 5.4.0r4.0, Type: Firewall+VPN
Base Mac: 0010.db90.f770
File Name: ssg5.5.4.0r4.0, Checksum: 48e3d429
```

The current mode appears on the second line of the output.

1. The module can be set to FIPS mode only through the CLI. To set the module to FIPS mode, execute the **set FIPS-mode enable** command through the CLI.

The **set FIPS-mode enable** command performs the following:

- Disables administration via SSL
  - Disables loading and output of configuration files from the TFTP server
  - Disables the NetScreen-Global PRO reporting agent
  - Disables the SNMP Read-Write community
  - Disables debug service
  - Disables the Modem port and USB port
  - Enforces management via Telnet, HTTP (WebUI) and NetScreen Security Manager (NSM) only through a VPN with 256-bit AES encryption
  - Enforces SSHv2 management traffic to use only Triple-DES. (SSHv1 is disabled.)
  - Disables the MD5 and DES algorithms
2. Confirm the **save** command.
  3. Confirm the **reset** command.

Note the following:

- Configure the HA encryption key before using the HA link.
- Management via Telnet, HTTP (WebUI) and NSM is only allowed through a VPN tunnel with 256-bit AES encryption.
- DSA-signed firmware image cryptographic strength analysis: the firmware is signed by a well-protected 1024 bit modulus DSA private key, which provides 80 bits of security. The generated signature is attached to the firmware. In order for the device

to accept an authorized image, the image has to have a correct signature.

- The image download takes at least 23 seconds, so there can be no more than 3 download tries within one minute. Therefore, the random success rate for multiple retries is  $1/(2^{320}) + 1/(2^{320}) + 1/(2^{320}) = 3/(2^{320})$ , which is far less than 1/100,000.
- The SSG 5 and 20 do not employ a maintenance interface or have a maintenance role.
- When in FIPS mode, the WebUI of the SSG 5 and SSG 20 only displays options that comply with the requirements of FIPS 140-2.
- The output data path is logically disconnected from the circuitry and processes that perform key generation or key zeroization.
- The SSG 5 and 20 provide a Show Status service via the GET service.
- The SSG 5 and 20 implement the following power-up self-tests:

Device Specific Self-Tests:

- Boot ROM firmware self-test is via DSA signature (Firmware Integrity Test)
- SDRAM read/write check
- FLASH test

Algorithm Self-Tests:

- Triple-DES, CBC mode, encrypt/decrypt KAT
- SHA-1 KAT
- RSA (encryption and signature) KAT
- DSA Sign/Verify pairwise consistency test
- AES, CBC mode, encrypt/decrypt KAT
- HMAC SHA-1 KAT
- ANSI X9.31 DRNG KAT
- DH exponentiation test

- The SSG 5 and SSG 20 implements the following conditional tests:
  - DRNG continuous test (both approved and non-approved RNG's)
  - DSA pairwise consistency test
  - RSA pairwise consistency test
  - Bypass test
  - Firmware download DSA signature test (Software Load Test)
  - DH pairwise consistency test
- On failure of any power-up self-test, the module enters and stays in either the Algorithm Error State, or Device specific error state, depending on the self-test failure. The console displays error messages and the status LED flashes red. It is the responsibility of the Crypto-Officer to return the module to Juniper Networks for further analysis.
- On failure of any conditional test, the module enters and stays in a permanent error state, depending on the type of failure: Bypass test failure, DH exponentiation test failure, RNG continuous test, Software load test, DSA pair-wise test failure, or RSA pair-wise agreement test failure. The console displays error messages and the status LED flashes red. It is the responsibility of the Crypto-Officer to return the module to Juniper Networks for further analysis.
- If the device enters one of the permanent error states as a result of a self-test failure,

the module is halted. No traffic is processed after this occurs. The module must have power cycled to return to operation. A self-test error message has the following format: "XXX test failed: error code N".

- In FIPS mode, the operator is prevented from configuring a VPN whose strength is stronger than the security provided by the management connection:
  - For sessions via a directly connected serial cable, no strength restriction is applied.
  - For remote SSH connections (which are protected by Triple-DES encryption), the strength of the management connection is considered to 112 bits. Therefore, the operator is prevented from configuring a VPN whose encryption algorithm has a strength greater than 112 bits, e.g. 128, 192 or 256 bit AES.
  - For remote telnet, WebUI or NSM connections, no strength restriction is applied, since these connections are already forced to pass through a 256-bit AES VPN.

## F. Other Parameters

Note the following:

- Firmware can be loaded through Trivial File Transfer Protocol (TFTP), where a firmware load test is performed via a DSA signature. Firmware may only be loaded in non-FIPS mode, as this service is disabled in FIPS mode
- Keys are generated using a FIPS approved pseudo random number generator per ANSI X9.31, Appendix C.
- For every usage of the module's random number generator, a continuous RNG self-test is performed. Note that this is performed on both the FIPS approved RNG and non-FIPS approved RNG.
- A separate session is assigned to each successful administrator login.

The first time an operator logs on to the module, the operator uses the default user name and password which is netscreen, netscreen. This user is assigned the Crypto-Officer role.

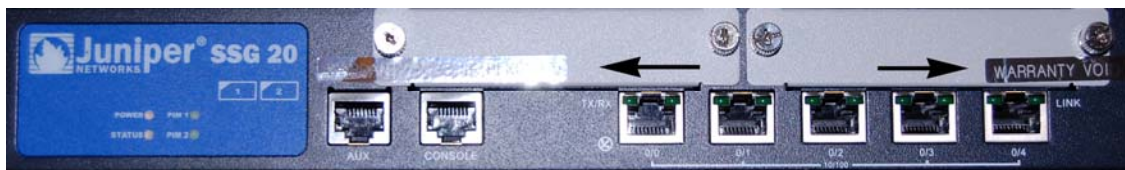
- The Crypto-Officer is provided with the same set of services as the user, with four additional services:
  - **set admin** and **unset admin** allow the Crypto-Officer to create a new user, change a current user's user name and password, or delete an existing user.
  - **set FIPS enable** and **unset FIPS enable** allow the Crypto-Officer to switch between FIPS mode and the default mode.
- HTTP can only come through VPN with AES encryption. The page time-out is set to 10 minutes by default; this setting can be user configured. The maximum number of HTTP connections, or the maximum number of concurrent WebUI logins, depends on how many TCP sockets are currently available in the system. The maximum number of available TCP sockets is 1024. This number is shared with other TCP connections.
- There are a maximum of three sessions shared between Telnet and SSH.
- Upon a Telnet or console login failure, the next prompt will not come up for an estimated 5 seconds.
- The SSG 5 and 20 chips are production-grade quality and include standard passivation techniques.
- The SSG 5 and 20 are contained within a metal production-grade enclosure.



Figure 1: Front of the SSG 5 device



**Figure 2: Rear of the SSG 5 device**



**Figure 3: Front of the SSG-20 device, with location of tamper evident seals**



**Figure 4: Rear of the SSG 20 device**



**Figure 5: Side of both SSG 5 and 20 devices, with location of tamper evident seal**

- The enclosures are opaque to visible spectrum radiation.
- The enclosure includes a removeable cover and is protected by a tamper-evident seal. Tamper evident seals (indicated by arrows in the photographs above) are applied to:
  - The front of the SSG 20 across each of the installed interface cards, or slot covers.
  - The sides of the SSG 5 and 20 covering both edges of the removeable cover.
- All keys and unprotected security parameters can be individually zeroized through the Unset, Clear, Delete, and Reset commands. Pressing the hardware reset button or issuing the "unset vendor-def" CLI command will cause the zeroization of all CSPs by

- reseting the device configuration to the factory default values.
- Algorithms included in the SSG 5 and SSG 20 are:
  - FIPS Approved:
    - DSA
    - SHA-1
    - Triple-DES (CBC)
    - AES (CBC)
    - HMAC-SHA-1
    - RSA Sign/Verify (PKCS #1)
    - ANSI X9.31 DRNG
  - Non-FIPS Approved:
    - DH (key agreement, key establishment methodology provides 97 bits of strength)
    - DES
    - MD5
    - RSA encryption/decryption (key wrapping, provides 80 or 112 bits of encryption strength)
- The SSG 5 and 20 conform to FCC part 15, class B.
- On failure of any power-up self-test, the module enters and stays in either the Algorithm Error State, or Device specific error state, depending on the self-test failure. The console displays error messages and the status LED flashes red. It is the responsibility of the Crypto-Officer to return the module to Juniper Networks for further analysis.
- On failure of any conditional test, the module enters and stays in a permanent error state, depending on the type of failure: Bypass test failure, DH exponentiation test failure, RNG continuous test, Software load test, DSA pair-wise test failure, or RSA pair-wise agreement test failure. The console displays error messages and the status LED flashes red. It is the responsibility of the Crypto-Officer to return the module to Juniper Networks for further analysis.
- On power down, previous authentications are erased from memory and need to be re-authenticated again on power-up.
- Bypass tests are performed at power-up, and as a conditional test. Bypass state occurs when the administrator configures the module with a non-VPN policy and an incoming packet whose source address, destination address and service matching this policy arrives at the network port. The bypass enabled status can be found by retrieving the entire policy list. Two internal actions must exist in order for bypass to happen: (1) a non-VPN policy is matched for this traffic, and (2) a routing table entry exists for the traffic that matches this non-VPN policy.
- In FIPS mode, SSH is forced to use Triple-DES for encryption.
- The High Availability (HA) feature allows the device to be configured to synchronize itself with a matching device. All data transferred between devices is 256 bit AES encrypted.
- If a VPN is configured to use Triple-DES encryption, Diffie-Hellman Group 5 is required for key agreement. DH groups 1 and 2 are disabled.
- The module is not designed to mitigate against attacks which are outside of the scope of FIPS 140-2.

## G. Physical Security Policy

Before carrying out any steps to deploy a Juniper Networks security appliance, the end-user must verify the security of the product with the following observations:

1. Confirm that the product received matches the version that is validated as FIPS 140-2 compliant.
2. The outside packaging does not show damage or evidence that it has been opened. If the cardboard shows damage that would allow the device to be removed or exchanged, this may be evidence of tampering.
3. Each box is packaged with custom tape to indicate that the device was packaged by Juniper Networks or an authorized manufacturer. The tape is unique, with the word NetScreen printed repeatedly along the tape. If the tape is not present, the device may have been tampered with.
4. The internal packaging does not show damage or evidence of tampering. The plastic bag should not have a large hole and the label that seals the plastic bag should not be detached or missing. If the bag or seal are damaged in any way, the device may have been tampered with.
5. The metal enclosure of the device is sealed with tamper-evident tape. If the seal is missing or damaged, the device may have been tampered with.

## H. FIPS Certificate Verification

In FIPS mode, if the signing CA certificate cannot be found in the SSG 5 and SSG 20 during the loading of the X509 certificate, the following message appears (where x is one of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F):

Please contact your CA's administrator to verify the following finger print (in HEX) of the CA cert...

xxxxxxxx xxxxxxxx xxxxxxxx xxxxxxxx xxxxxxxx

Do you want to accept this certificate y/[n]?

Based on the result of the CA certificate fingerprint checking, the Crypto-Officer accepts or denies the loaded certificates.

## I. Critical Security Parameter (CSP) Definitions

Below is a list of Critical Security Parameter (CSP) definitions:

- **IPSEC HMAC SHA-1 Key:** Used by IPsec for data integrity.
- **IPSEC ESP Key:** Triple-DES, and AES for user traffic encryption.
- **IKE Pre-Shared Key:** Used during the IKE protocol to establish cryptographic keys to be used by IKE.
- **IKE Encryption Key:** Triple-DES, and AES for peer-to-peer IKE message encryption.



- **IKE HMAC SHA-1 Key:** Used by IKE for data integrity.
- **Password:** Crypto-Officer and User passwords.
- **SSH Server/Host DSA Private Key:** Used to create digital signatures.
- **SSH Encryption Key:** Triple-DES encryption key to encrypt telnet commands.
- **SSH HMAC SHA-1 Key:** Used by SSH for data integrity.
- **HA Key:** AES Encryption key for HA data.
- **IKE RSA/DSA Private Key:** DSA/RSA key used in IKE identity authentication.
- **Diffie Hellman Private Key Components:** Used during the DH key agreement protocol.
- **PRNG Algorithm Key:** Used during the ANSI X9.31 generation of pseudo random numbers.

## J. Public Key Definitions

Below is a list of the public keys utilized by the module:

- **Firmware Authentication Key:** Used by the device to verify DSA signatures over firmware images.
- **CA DSA/RSA Public Key:** Used by IKE to authenticate a peer's certificate.
- **Local DSA/RSA Public Key:** Used by the IKE peer to verify digital signatures.
- **SSH Server/Host DSA Public Key:** Used by the SSH client to verify digital signatures.
- **SSH Client DSA Public Key:** Used by the device to verify digital signatures.
- **Diffie Hellman Public Key Components:** Used by the DH Key Agreement protocol.

## K. Matrix Creation of Critical Security Parameter (CSP) versus the Services (Roles & Identity)

The following matrices define the set of services to the CSP of the module, providing information on generation, destruction and usage. They also correlate the User roles and the Crypto-Officer roles to the set of services to which they have privileges.

The matrices use the following convention:

- G: Generate
- D: Delete
- U: Usage
- N/A: Not Available

**Table 7: Crypto-Officer**

| CSP \ Services                        | Set            | Unset          | Clear/Delete | Get | Exec      | Save | Ping | Reset             | Exit | Trace-route |
|---------------------------------------|----------------|----------------|--------------|-----|-----------|------|------|-------------------|------|-------------|
| IPSEC HMAC SHA-1 Key                  | G              | D              | N/A          | U   | N/A       | U    | N/A  | N/A               | N/A  | N/A         |
| IPSEC ESP Key                         | G              | D              | N/A          | U   | N/A       | U    | N/A  | N/A               | N/A  | N/A         |
| IKE Pre-shared Key                    | G              | D              | N/A          | U   | G         | U    | N/A  | N/A               | N/A  | N/A         |
| IKE Encryption Key                    | N/A            | N/A            | D            | N/A | N/A       | N/A  | N/A  | D                 | N/A  | N/A         |
| IKE HMAC SHA-1 Key                    | N/A            | N/A            | D            | N/A | N/A       | N/A  | N/A  | D                 | N/A  | N/A         |
| Password                              | G <sup>1</sup> | D <sup>2</sup> | N/A          | U   | N/A       | U    | N/A  | N/A               | N/A  | N/A         |
| SSH Server/Host DSA Private Key       | G              | D              | D            | U   | G         | U    | N/A  | D<br>(Server Key) | N/A  | N/A         |
| SSH Encryption Key                    | N/A            | N/A            | D            | N/A | N/A       | N/A  | N/A  | D                 | N/A  | N/A         |
| SSH HMAC SHA-1 Key                    | N/A            | N/A            | D            | N/A | N/A       | N/A  | N/A  | D                 | N/A  | N/A         |
| HA Key                                | G              | D              | N/A          | N/A | U         | U    | N/A  | N/A               | N/A  | N/A         |
| IKE RSA/DSA Private Key               | N/A            | D              | N/A          | N/A | G,D,<br>U | N/A  | N/A  | N/A               | N/A  | N/A         |
| PRNG Algorithm Key                    | N/A            | N/A            | N/A          | N/A | G,U       | N/A  | N/A  | D                 | N/A  | N/A         |
| Diffie Hellman Private Key Components | G              | N/A            | N/A          | N/A | N/A       | N/A  | N/A  | D                 | N/A  | N/A         |

**Table 8: User**

| CSP \ Services                        | Set            | Unset | Clear/Delete | Get | Exec  | Save | Ping | Reset             | Exit | Trace-route |
|---------------------------------------|----------------|-------|--------------|-----|-------|------|------|-------------------|------|-------------|
| IPSEC HMAC SHA-1 Key                  | G              | D     | N/A          | U   | N/A   | U    | N/A  | N/A               | N/A  | N/A         |
| IPSEC ESP Key                         | G              | D     | N/A          | U   | N/A   | U    | N/A  | N/A               | N/A  | N/A         |
| IKE Pre-shared Key                    | G              | D     | N/A          | U   | G     | U    | N/A  | N/A               | N/A  | N/A         |
| IKE Encryption Key                    | N/A            | N/A   | D            | N/A | N/A   | N/A  | N/A  | D                 | N/A  | N/A         |
| IKE HMAC SHA-1 Key                    | N/A            | N/A   | D            | N/A | N/A   | N/A  | N/A  | D                 | N/A  | N/A         |
| Password                              | G <sup>3</sup> | G,D   | N/A          | U   | N/A   | U    | N/A  | N/A               | N/A  | N/A         |
| SSH Server/Host DSA Private Key       | G              | D     | D            | U   | G     | U    | N/A  | D<br>(Server Key) | N/A  | N/A         |
| SSH Encryption Key                    | N/A            | N/A   | D            | N/A | N/A   | N/A  | N/A  | D                 | N/A  | N/A         |
| SSH HMAC SHA-1 Key                    | N/A            | N/A   | D            | N/A | N/A   | N/A  | N/A  | D                 | N/A  | N/A         |
| HA Key                                | G              | D     | N/A          | N/A | U     | U    | N/A  | N/A               | N/A  | N/A         |
| IKE RSA/DSA Private Key               | N/A            | D     | N/A          | N/A | G,D,U | N/A  | N/A  | N/A               | N/A  | N/A         |
| PRNG Algorithm Key                    | N/A            | N/A   | N/A          | N/A | G,U   | N/A  | N/A  | N/A               | N/A  | N/A         |
| Diffie Hellman Private Key Components | G              | N/A   | N/A          | N/A | N/A   | N/A  | N/A  | D                 | N/A  | N/A         |

**Table 5: Read-Only User**

| CSP \ Services                        | Get | Ping | Exit | Trace-route |
|---------------------------------------|-----|------|------|-------------|
| IPSEC HMAC SHA-1 Key                  | U   | N/A  | N/A  | N/A         |
| IPSEC ESP Key                         | U   | N/A  | N/A  | N/A         |
| IKE Pre-shared Key                    | U   | N/A  | N/A  | N/A         |
| IKE Encryption Key                    | N/A | N/A  | N/A  | N/A         |
| IKE HMAC SHA-1 Key                    | N/A | N/A  | N/A  | N/A         |
| Password                              | U   | N/A  | N/A  | N/A         |
| SSH Server/Host DSA Private Key       | U   | N/A  | N/A  | N/A         |
| SSH Encryption Key                    | N/A | N/A  | N/A  | N/A         |
| SSH HMAC SHA-1 Key                    | N/A | N/A  | N/A  | N/A         |
| HA Key                                | N/A | N/A  | N/A  | N/A         |
| IKE RSA/DSA Private Key               | N/A | N/A  | N/A  | N/A         |
| PRNG Algorithm Key                    | N/A | N/A  | N/A  | N/A         |
| Diffie Hellman Private Key Components | N/A | N/A  | N/A  | N/A         |

1. The Crypto-Officer is authorized to change all authorized operators' user names and passwords, but the user is only allowed to change his/her own user name and password
2. The Crypto-Officer is authorized to remove all authorized operators.
3. The Crypto-Officer is authorized to change all authorized operators' user names and passwords, but the user is only allowed to change his/her own user name and password.

**Table 9: How Keys Are Generated**

| <b>CSP</b>                            | <b>Method of Generation</b>  |
|---------------------------------------|--|
| IPSEC HMAC SHA-1 Key                  | May be either manually entered by the administrator, or generated internally via ANSI X9.31 RNG as a result of IKE protocol exchanges. |
| IPSEC ESP Key                         | "  |
| IKE Pre-shared Key                    | Manually entered by administrator  |
| IKE Encryption Key                    | Internally via ANSI X9.31 RNG, as a result of IKE protocol exchanges   |
| IKE HMAC SHA-1 Key                    | "  |
| Password                              | Manually entered by administrator  |
| SSH Server/Host DSA Private Key       | Internally via ANSI X9.31 RNG when DSA key-pair is generated.  |
| SSH Encryption Key                    | Internally via ANSI X9.31 RNG, as a result of Diffie-Hellman key exchange during SSH session establishment.                            |
| SSH HMAC SHA-1 Key                    | "  |
| HA Key                                | Manually entered by administrator  |
| IKE RSA/DSA Private Key               | Internally via ANSI X9.31 RNG  |
| Diffie Hellman Private Key Components | "  |
| PRNG Algorithm Key                    | Initial generation via entropy gathered from a variety of internal sources.  |

## L. Definitions List

AES – Advance Encryption Standard  
CLI – Command Line Interface  
CSP – Critical Security Parameter  
DES – Data Encryption Standard  
DH – Diffie-Hellman  
DRNG – Deterministic RNG  
HA – High Availability  
IPSec – Internet Protocol Security  
IV – Initial Vector  
KAT – Known Answer Test  
NS – NetScreen  
NSM – NetScreen Security Manager  
PRNG – Pseudo RNG  
RNG – Random Number Generator  
ROM – Read Only Memory  
RSA – Rivest Shamir Adelman Algorithm  
SDRAM – Synchronous Dynamic Random Access Memory  
SSH – Secure Shell protocol  
TCP – Transmission Control Protocol  
TFTP – Trivial File Transfer Protocol  
VPN – Virtual Private Networking