

# *FIPS 140-2 SECURITY POLICY*

*Juniper Networks*

*NetScreen-500*

*HW P/N NS-500, FW Version ScreenOS 5.4.0r4*

*Document # 530-012311-01*

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## FCC Statement

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 NetScreen-500 is an Internet security device that integrates firewall, virtual private networking (VPN), and traffic shaping functions.

Through the VPN, NetScreen-500 device 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 NetScreen-500 also 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 NetScreen-500 include firmware and hardware. The main hardware components consist of a main processor, memory, flash, ASIC (GigaScreen), 10/100 Mbps ethernet interface, GBIC network interface, console interface, backplane, redundant power supplies and fan tray. The entire case is defined as the cryptographic boundary of the module. The NetScreen-500 physical configuration is defined as a multi-chip standalone module.

## B. Security Level

The NetScreen-500 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                                   | 2     |
| Self-Tests                                | 2     |
| Design Assurance                          | 2     |
| Mitigation of Other Attacks               | N/A   |

## C. Roles and Services

The NetScreen-500 supports five distinct roles:

- **Cryptographic Officer (Root):** The device allows one Crypto-Officer. This role is assigned to the first operator who logs on to the device using the default admin name and password (netscreen, netscreen). Only the Crypto-Officer can create other administrators, and change the device to operate in FIPS mode.
- **User (Admin):** This role can configure specific security policies. These policies provide the device with information on how to operate. For example, configuring access policies and VPN encryption with Triple-DES). This role does not have the ability to create other administrators..
- **Read-Only User (Admin):** This role can only perform a limited set of services to retrieve information or status. This role cannot perform services to configure the device.
- **VSYS User:** This role has the same operations as the User, listed previously, except that a VSYS User only operates within a particular virtual system. See the *NetScreen Concepts & Examples ScreenOS Reference Guide* for more information about virtual systems.
- **VSYS Read-Only User:** This role has the same operations as the Read-Only User, listed previously, except that a VSYS Read-Only User only operates within a particular virtual system. See the *NetScreen Concepts & Examples ScreenOS Reference Guide* for more information about virtual systems.

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

The NetScreen-500 provides the following services for each role:

Table 2: Roles and services summary

| Service                                                                                          | Cryptographic Officer | User, VSYS User | Read-only User, Read-only VSYS 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             | <b>Y</b> | <b>Y</b> | <b>N</b> |
| <b>Unset:</b> Unconfigure system parameters | <b>Y</b> | <b>Y</b> | <b>N</b> |

- **Clear/Delete:** Clear dynamic system info
- **Exec:** Exec system commands
- **Exit:** Exit command console
- **Get (Show Status):** Get system information
- **Ping:** Ping other host
- **Reset (Self-Tests):** Reset system
- **Save:** Save command
- **Set:** Configure system parameters
- **Trace-route:** Trace route
- **Unset:** Unconfigure system parameters

The NetScreen-500 supports both role-based and identity-based authentication.

- All roles can be authenticated locally (within the NetScreen device); 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 NetScreen-500 enforces 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 NetScreen device 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 NetScreen-500 device provide a number of interfaces:

- LCD and Control Pad: A display with control keys that can be used to perform basic configurations and to view status reports through the LCD and control pad. The LCD displays two lines, each line capable of displaying up to 16 characters (Control Input, Status Output).
- Two to four network cards. These may be either 10/100 Base T or GBIC interfaces (Data Input, Data Output, Control, Status).
- HA-1: dedicated RJ-45 used for failover processing (Data Input, Data Output, Control, Status).
- HA-2: backup dedicated RJ-45 used for failover processing if HA-1 fails (Data Input, Data Output, Control, Status).
- MGT: dedicated RJ-45 used exclusively for management traffic, such as Telnet, SSH, or HTTP (Control, Status).
- Console port: DB9 serial port connector (Control, Status). This port allows initial access to the Command Line Interface (CLI).
- Modem port: DB9 serial port connector. Disabled in FIPS mode.
- PCMCIA interface for a memory flash card (Data Input).
- Up to two power interfaces.
- 22 LED status interfaces: 12 general, 4-interface module, and 6 port LEDs (Status). The following sections describe these LEDs.

Table 3: Twelve General LEDs:

| LED    | Purpose       | Color          | Meaning                                                                                                                                                                                                                                                                                                                                      |
|--------|---------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| STATUS | System status | Blinking amber | Booting up normally                                                                                                                                                                                                                                                                                                                          |
|        |               | Blinking green | Normal operation                                                                                                                                                                                                                                                                                                                             |
| ALARM  | System alarm  | Red            | Critical alarm - failure of hardware component or software module (such as a cryptographic algorithm)                                                                                                                                                                                                                                        |
|        |               | Green          | No alarm condition present                                                                                                                                                                                                                                                                                                                   |
|        |               | Amber          | Major alarm: <ul style="list-style-type: none"><li>○ Low memory (&lt;10% remaining)</li><li>○ High CPU utilization (&gt;90%)</li><li>○ Log memory full</li><li>○ Sessions full</li><li>○ Maximum number of VPN tunnels reached</li><li>○ Firewall attacks detected</li><li>○ HA status changed or redundant group member not found</li></ul> |



|         |                              |                 |                                                                                        |
|---------|------------------------------|-----------------|----------------------------------------------------------------------------------------|
|         |                              | Dark            | No alarm                                                                               |
| PWR1    | Power Supply #1              | Green           | Power supply #1 is functioning correctly                                               |
|         |                              | Red             | Power supply failure, or bay is empty                                                  |
| PWR2    | Power Supply #2              | Green           | Power supply #1 is functioning correctly                                               |
|         |                              | Red             | Power supply failure, or bay is empty                                                  |
| FAN     | Fan status                   | Green           | All fans functioning properly                                                          |
|         |                              | Red             | One or more fans failed                                                                |
| TEMP    | Temperature                  | Green           | Temperature is within safety range                                                     |
|         |                              | Red             | Outside safety range                                                                   |
| HA      | High Availability            | Green           | Unit is master                                                                         |
|         |                              | Blinking green  | Redundant group member cannot be found                                                 |
|         |                              | Amber           | Unit is slave                                                                          |
|         |                              | Dark            | HA not configured                                                                      |
| FW      | Firewall alarm               | Green           | No alarm attacks                                                                       |
|         |                              | Red             | Firewall alarm/event has occurred                                                      |
| VPN     | VPN activity                 | Blinking green  | VPN activity - encrypting/decrypting traffic                                           |
|         |                              | Blinking yellow | VPN drops or denies traffic                                                            |
|         |                              | Red             | VPN tunnels have reached 90% of the maximum number of simultaneously active IPSec SAs. |
|         |                              | Dark            | No VPN defined or no tunnels active                                                    |
| SESSION | Firewall session utilization | Green           | Sessions are < 70% utilization                                                         |
|         |                              | Yellow          | Sessions are between 70% and 90% utilization.                                          |
|         |                              | Red             | Sessions are >90% utilization.                                                         |
| PCMCIA  | PC card status               | Green           | PC card is installed in PCMCIA slot.                                                   |
|         |                              | Blinking green  | PC card is active                                                                      |
|         |                              | Red             | PC card is >90% full or read/write activity has failed.                                |
|         |                              | Dark            | PCMCIA slot is empty.                                                                  |
| SHAPE   | Traffic shaping              | Green           | Traffic shaping in operation                                                           |
|         |                              | Blinking green  | Traffic shaping transmits packets                                                      |
|         |                              | Blinking yellow | Traffic shaping drops packets                                                          |
|         |                              | Red             | Configured guaranteed bandwidth > available interface bandwidth                        |
|         |                              | Dark            | No traffic shaping configured                                                          |

- Four module status LEDs: Illuminates green to correspond to the position of the installed interface modules (Status):

Green: Card operational  
Blinking Red: Card failed  
Dark: No card

- Six network status LEDs for the MGT, HA-1 and HA-2 ports. Each Ethernet port has two LEDs: the left LED indicates 10Mbps or 100Mbps; the right LED indicates link and network activity (Status).

## 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: NS500
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: ns500.5.4.0r4.0, 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
  - 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 NetScreen-500 does not employ a maintenance interface or have a maintenance role.
- When in FIPS mode, the WebUI of the NetScreen-500 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 NetScreen-500 provides a Show Status service via the GET service.
- The tNetScreen-500 implements 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 (encrypt/decrypt and sign/verify) 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 NetScreen-500 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 NetScreen-500 chips are production-grade quality and include standard passivation techniques.
- The NetScreen-500 is contained within a metal production-grade enclosure.



**Figure 1: Front of the NetScreen-500, with location of tamper evident seals**



**Fig. 2: Rear of NetScreen-500, with location of temper evident seals**

- 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 device across each of the installed interface cards, or slot covers.
  - The power blocks at the back of the unit and extending on to the removeable cover.
- IKE, Diffie-Hellman (DH), and RSA key wrapping are employed for public key-based key distribution techniques, which are commercially available public key methods.
- 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 resetting the device configuration to the factory default values.
- Algorithms included in the NetScreen-500 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)
    - RSA encryption/decryption (key wrapping, provides 80 or 112 bits of encryption)

strength)

- The NetScreen-500 conforms to FCC part 15, class A.
- 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 NetScreen-500 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 4: 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 5: User and VSYS 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 6: Read-Only User and VSYS 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 7: 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  
GBIC - Gigabit Interface Converter  
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