

# **FIPS 140-3 Non-Proprietary Security Policy**

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**SonicWall, Inc.**

**SonicWall NSa 4700, NSa 5700, NSa 6700, NSsp 10700,  
NSsp 11700, NSsp 13700**

**Firmware Version: SonicOS/X 7.0.1**

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## Introduction

Federal Information Processing Standards Publication 140-3 — Security Requirements for Cryptographic Modules specifies requirements for cryptographic modules to be deployed in a Sensitive but Unclassified environment. The National Institute of Standards and Technology (NIST) and Canadian Centre for Cyber Security (CCCS) Cryptographic Module Validation Program (CMVP) run the FIPS 140-3 program. The NVLAP accredits independent testing labs to perform FIPS 140-3 testing; the CMVP validates modules meeting FIPS 140-3 validation. Validated is the term given to a module that is documented and tested against the FIPS 140-3 criteria.

More information is available on the CMVP website at:

<https://csrc.nist.gov/projects/cryptographic-module-validation-program>

## About this Document

This FIPS 140-3 non-proprietary Cryptographic Module Security Policy for the SonicWall, Inc. SonicWALL NSa 4700, Nsa 5700, NSa 6700, NSsp 10700, NSsp 11700 and NSsp 13700 models provides an overview of the product and a high-level description of how it meets the overall Level 2 security requirements of FIPS 140-3.

## Disclaimer

The contents of this document are subject to revision without notice due to continued progress in methodology, design, and manufacturing. SonicWall, Inc. shall have no liability for any error or damages of any kind resulting from the use of this document.

## Notices

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## 1. General

This document describes the cryptographic module security policy for the SonicWall, Inc. SonicWALL NSa 4700, Nsa 5700, NSa 6700, NSsp 10700, NSsp 11700 and NSsp 13700 models (FW version: SonicOS/X 7.0.1) cryptographic module (also referred to as the “module” hereafter). It contains the specification of the security rules, under which the cryptographic module operates, including the security rules derived from the requirements of the FIPS 140-3 standard.

The Module, a hardware cryptographic module, meets the overall security level 2 requirements. The following table lists the level of validation for each area in FIPS 140-3:

ISO/IEC 24759 Section 6. [Number Below]	FIPS 140-3 Section Title	Security Level
1	General	2
2	Cryptographic module specification	2
3	Cryptographic module interfaces	2
4	Roles, services, and authentication	3
5	Software/Firmware security	2
6	Operational environment	N/A
7	Physical security	2
8	Non-invasive security	N/A
9	Sensitive security parameter management	2
10	Self-tests	2
11	Life-cycle assurance	2
12	Mitigation of other attacks	2

*Table 1 - Security Levels*

## 2. Cryptographic Module Specification

The module is an Internet security appliance, which provides stateful packet filtering firewall, deep packet inspection, virtual private network (VPN), and traffic shaping services.

The module is intended for use by US Federal agencies and other markets that require FIPS 140-3 validated cryptographic modules. The appliance Encryption technology uses Suite B algorithms. Suite B algorithms are approved by the U.S. government for protecting both Unclassified and Classified data.

### Module Description and Cryptographic Boundary

The cryptographic module is defined as a multi-chip standalone hardware module. The cryptographic boundary of the module is the surfaces and edges of the device enclosure, inclusive of the physical ports. The physical form of the Module is depicted below.



Figure 1. Front view of the NSA 4700



Figure 2. Front view of the NSA 5700



Figure 3. Rear view of the NSA 4700/NSA 5700



Figure 4. Front view of the NSA 6700



Figure 5. Rear view of the NSa 6700



Figure 6. Front view of the NSsp 10700



Figure 7. Front View of the NSsp 11700



Figure 8. Front View of the NSsp 13700



Figure 9. Rear View of the NSsp 10700/NSsp 11700/NSsp 13700

The cryptographic module tested configurations can be found in the table below:

Model	Hardware [Part Number and Version]	Firmware Version	Distinguishing Features
NSa 4700	101-500668-55 (Rev A)	SonicOS/X 7.0.1	Optional add in 1TB storage and redundant power supply, field replacement power supply and fan modules
Nsa 5700	101-500667-52 (Rev A)	SonicOS/X 7.0.1	Optional add in 1TB storage and redundant power supply, field replacement power supply and fan modules
NSa 6700	101-500685-55 (Rev A)	SonicOS/X 7.0.1	Optional add in 1TB storage and redundant power supply, field replacement power supply and fan modules
NSsp 10700	101-500684-51 (Rev B)	SonicOS/X 7.0.1	Field replacement power supply and fan modules
NSsp 11700	101-500683-51 (Rev B)	SonicOS/X 7.0.1	Field replacement power supply and fan modules
NSsp 13700	101-500647-54 (Rev B)	SonicOS/X 7.0.1	Field replacement power supply and fan modules

Table 2 - Cryptographic Module Tested Configuration

## Cryptographic Algorithms

The Module implements the Approved and Non-Approved but Allowed cryptographic functions listed in the tables below.

CAVP Cert	Algorithm and Standard	Mode/Method	Description / Key Size(s) / Key Strength(s)	Use / Function
A6598	AES FIPS 197 SP800-38A	CBC	Key Sizes: 128, 192, 256	Encrypt, Decrypt
A6598	AES FIPS 197 SP800-38D	GCM [38D] <sup>1</sup>	Key Sizes: 128, 192, 256 Tag Len: 128	Authenticated Encrypt, Authenticated Decrypt, Message Authentication
A2138	AES FIPS 197 SP800-90B	Conditioning Component CBC-MAC	Key Size: 128 Payload Length: 128	Conditioning component used in Entropy Source

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<sup>1</sup> The module's AES-GCM implementation conforms to IG C.H scenario #1 following RFC 5288 for TLS. The module is compatible with TLSv1.2 (RFC 7627) and provides support for the acceptable GCM cipher suites from Section 3.3.1 of SP 800-52 Rev1 or SP 800-52 Rev2. The counter portion of the IV is set by the module within its cryptographic boundary. The construction of the 64-bit nonce\_explicit part of the IV is deterministic via a monotonically increasing counter. When the IV exhausts the maximum number of possible values for a given session key, the first party, client or server, to encounter this condition will trigger a handshake to establish a new encryption key. In case the module's power is lost and then restored, a new key for use with the AES GCM encryption/decryption shall be established. The module's AES GCM implementation also conforms to IG C.H Scenario #5 following RFC 8446 for TLS 1.3 and provides support for the acceptable GCM cipher suites from Section B.4 of RFC 8446 and confirms that the IV is generated and used within the protocol's implementation.

CAVP Cert	Algorithm and Standard	Mode/Method	Description / Key Size(s) / Key Strength(s)	Use / Function
Vendor Affirmed	CKG NIST SP 800-133rev2	Section 4	N/A	Key Generation
A6598	CVL RFC 8446	KDF TLS v1.3 (as per Section 7.1 of RFC 8446)	SHA2-256, SHA2-384	Key Derivation
A6598	CVL NIST SP 800-135rev1	IKEv1 Digital Signature and PSK	SHA2-256, SHA2-384, SHA2-512	Key Derivation
A6598	CVL NIST SP 800-135rev1	IKEv2 DH 224-521 bits	SHA2-256, SHA2-384, SHA2-512	Key Derivation
A6598	CVL NIST SP 800-135rev1	TLS v1.2 (RFC 7627)	SHA2-256, SHA2-384, SHA2-512	Key Derivation
A6598	ECDSA (FIPS186-5)	SigGen	P-224, P-256, P-384, P-521	Signature Generation
A6598	ECDSA (FIPS186-5)	SigVer	P-256, P-384, P-521	Signature Verification
A6598	DRBG SP800-90Arev1	Hash DRBG	Mode: SHA2-256 Entropy Input: 256 Nonce: 128	Deterministic Random Bit Generation

CAVP Cert	Algorithm and Standard	Mode/Method	Description / Key Size(s) / Key Strength(s)	Use / Function
A6598	ECDSA FIPS PUB 186-5	KeyGen	P-224, P-256, P-384, P-521	Key Pair Generation
A6598	ECDSA FIPS PUB 186-5	KeyVer	P-224, P-256, P-384, P-521	Key Pair Validation
A6598	HMAC FIPS PUB 198-1	HMAC-SHA-1	MAC: 32-160 Increment 8 Key Length: 8-524288 Increment 8	Message Authentication, KDF Primitive
A6598	HMAC FIPS PUB 198-1	HMAC-SHA-256	MAC: 32-256 Increment 8 Key Length: 8-524288 Increment 8	
A6598	HMAC FIPS PUB 198-1	HMAC-SHA-384	MAC: 32-384 Increment 8 Key Length: 8-524288 Increment 8	
A6598	HMAC FIPS PUB 198-1	HMAC-SHA-512	MAC: 32-512 Increment 8 Key Length: 8-524288 Increment 8	
A6598	KAS-1 [IG D.F]	KAS-FFC-SSC (SP 800-56Arev3 Shared Secret Computation, Per Scenario 2 of IG D.F)	Domain Parameter Generation Methods: FB, FC, ffdhe2048, MODP-2048; provides 112 bits of encryption strength	Key Agreement
A6598	KAS-2 [IG D.F]	KAS-ECC-SSC (SP 800-56Arev3 Shared Secret Computation, Per Scenario 2 of IG D.F)	Domain Parameter Generation Methods: P-256, P-384, P-521; provides between 128 and 256 bits of encryption strength	Key Agreement

CAVP Cert	Algorithm and Standard	Mode/Method	Description / Key Size(s) / Key Strength(s)	Use / Function
A6598	KTS-1 [IG D.G]	AES-CBC with HMAC-SHA-1	AES-CBC (Key Sizes: 128, 256); HMAC-SHA-1; provides 128 or 256 bits of encryption strength	Key Transport/Authentication (TLS 1.2)
A6598	KTS-2 [IG D.G]	AES-CBC with HMAC-SHA2-256	AES-CBC (Key Sizes: 128, 256); HMAC-SHA2-256; provides 128 or 256 bits of encryption strength	Key Transport/Authentication (TLS 1.2)
A6598	KTS-3 [IG D.G]	AES-GCM	AES-GCM (Key Sizes: 128, 256); provides 128 or 256 bits of encryption strength	Key Transport (TLS 1.3)
A6598	RSA (FIPS 186-5)	KeyGen	Mod: 2048, 3072, 4096	Key Generation
A6598	RSA (FIPS 186-5)	SigGen: PKCS 1.5	Mod: 2048, 3072, 4096	Signature Generation
A6598	RSA (FIPS 186-5)	SigVer: PKCS 1.5	Mod: 2048, 3072, 4096	Signature Verification
A6598	Safe Primes	NIST SP 800-56A, Rev3	Safe Prime Groups: ffdhe2048, MODP-2048	Key Generation
A6598	Safe Primes	NIST SP 800-56A, Rev3	Safe Prime Groups: ffdhe2048, MODP-2048	Key Verification
A6598	SHS FIPS PUB 180-4	SHA-1 SHA-256 SHA-384 SHA-512	Message Length: 0-65536 Increment 8	Message Digest Generation
N/A	SP 800-90B	N/A	Intel entropy source is used and meets SP800-90B and IG D.K compliance	For seeding DRBG

Table 3 – Approved Algorithms

Note: There are some algorithms, modes, moduli and key sizes that have been CAVP tested but are not implemented/used by the module. Only the algorithms, modes, and key sizes shown in this table are implemented by the module.

<b>Algorithm</b>	<b>Caveat</b>	<b>Use / Function</b>
DSA	Allowed per I.G. C.K resolution #3. (PQGGen and KeyGen tests performed)	Used as part of SP 800-56Ar3 key agreement

Table 4 – Non-Approved Algorithms Allowed in the Approved Mode of Operation

The module supports the following non-Approved but allowed algorithms with no security claimed:

<b>Algorithm</b>	<b>Caveat</b>	<b>Use / Function</b>
Triple-DES	No security claimed	Associated with the configuration setting. Used to encrypt/decrypt Gateway Anti-Virus (GAV) signature files (internal to the module only)  (This function is considered obfuscation and cannot be used to store or transmit sensitive information)
MD5	No security claimed	Used to obfuscate RADIUS and TACACS+ (always encapsulated using IPsec)
PBKDF (non-compliant)	No security claimed	Associated with RADIUS (always encapsulated using IPsec)

Table 5 – Non-Approved Algorithms Allowed in the Approved Mode of Operation with No Security Claimed

The module supports the following Non-Approved Algorithms Not Allowed in the Approved Mode of Operation:

<b>Algorithm/Function</b>	<b>Use / Function</b>
KDF-SSH	Used for SSH operations in the non-approved mode
KDF-SNMP	Used for SNMP operations in the non-approved mode

Table 5a – Non-Approved Algorithms Not Allowed in the Approved Mode of Operation

Protocol <sup>2</sup>	Key Exchange	Auth	Cipher	Integrity
IKEv1	DH Group 14, 19, 20, 21	RSA and ECDSA digital signature	AES CBC 128/192/256	HMAC-SHA-256-128 HMAC-SHA-384-192 HMAC-SHA-512-256
IKEv2	DH Group 14, 19, 20, 21	RSA and ECDSA Digital Signature Shared Key Message Integrity Code	AES CBC 128/192/256	HMAC-SHA-256-128 HMAC-SHA-384-192 HMAC-SHA-512-256
IPsec ESP	IKEv1 or IKEv2 with optional: Diffie-Hellman (L=2048, N=224, 256) EC Diffie-Hellman P-256, P- 384 and P-521	IKEv1, IKEv2	AES CBC 128/192/256	HMAC-SHA-256-128 HMAC-SHA-384-192 HMAC-SHA-512-256
TLS 1.2	TLS_RSA_WITH_AES_128_CBC_SHA TLS_RSA_WITH_AES_256_CBC_SHA TLS_RSA_WITH_AES_128_CBC_SHA256 TLS_RSA_WITH_AES_256_CBC_SHA256 TLS_RSA_WITH_AES_128_GCM_SHA256 TLS_RSA_WITH_AES_256_GCM_SHA384			
TLS 1.3	TLS_AES_128_GCM_SHA256 TLS_AES_256_GCM_SHA384			

Table 6 - Security Relevant Protocols Used in Approved Mode

## Modes of Operation

### Approved Mode of Operation

The Approved mode configuration can be determined by the operator, by checking the state of the “Approved Mode” checkbox on the System/Settings page over the web interface or issuing “show fips” command over the console. When the “Approved mode” checkbox is selected, the module executes a compliance checking procedure, examining all settings related to the security rules described below. The operator is responsible for appropriately updating these settings during setup and will be prompted by the compliance tool if a setting has been modified taking the module out of compliance. The “Approved mode” checkbox and corresponding system flag (“fips”), which can be queried over the console, will not be set unless all settings are compliant. The “Approved mode” checkbox and fips system flag are indicators that the module is running in the Approved mode of operation.

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<sup>2</sup> No parts of the TLS or IKE protocols, other than the approved cryptographic algorithms and the KDFs, have been tested by the CAVP and CMVP.

The module is not configured to operate in Approved mode by default. The following steps shall be taken during set-up of the module to enable Approved mode of operation:

1. The default Administrator and User passwords shall be immediately changed and be at least eight (8) characters.
2. The RADIUS/TACACS+ shared secrets shall be at least eight (8) characters.
3. Traffic between the module and the RADIUS/TACACS+ server shall be secured via an IPsec tunnel.  
\*Note: This step only needs to be performed if RADIUS or TACACS+ is supported.
  - LDAP cannot be enabled in Approved mode without being protected by TLS
  - LDAP cannot be enabled in Approved mode without selecting 'Require valid certificate from server'
  - LDAP cannot be enabled in Approved mode without valid local certificate for TLS
4. IKE shall be configured with 3<sup>rd</sup> Party Certificates or Preshared key for IPsec Keying Mode when creating VPN tunnels.
  - RSA Certificates lengths shall be 2048-bit or greater in size.
  - ECDSA Certificates curves shall be P-256, P-384 or P-521 only.  
or
  - Preshared key lengths shall be no less than 8 characters.
5. When creating VPN tunnels, ESP shall be enabled for IPSec.
6. Approved algorithms shall be used for encryption and authentication when creating VPN tunnels.
7. Group 14, 19, 20 or 21 shall be used for IKE Phase 1 DH Group. SHA-256 and higher shall be used for Authentication
8. “Advanced Routing Services” shall not be enabled.
9. “Group VPN management” shall not be enabled.
10. SNMP or SSH shall not be enabled.
11. The “SonicWALL Read-Only Admins,” group, satisfies neither the Cryptographic Officer nor the User Role and shall not be used in the Approved mode operation.

Note: Once the Approved mode of operation is enabled, SonicOSX enforces all of the above items. (Operators will not be allowed to change these features while in Approved mode of operation.)

Additionally:

The operator shall not enable the following :

- USB interface(s)
- Wireless interface
- 802.11i wireless security

## Non-Approved Mode of Operation

The Cryptographic Module provides the same set of services in the non-Approved mode as in the Approved mode but allows the following additional administration options and non-approved services which are not used in the Approved mode of operation. The following services shall be disabled before placing the module in Approved mode. The module does not transition to Approved mode until the following services are disabled.

- AAA server authentication (the Approved mode requires operation of RADIUS or TACACS+ only within a secure VPN tunnel)
- SSH
- SNMP

## Security Rules and Guidance

This section documents the security rules for the secure operation of the cryptographic module to implement the security requirements of FIPS 140-3.

1. The module provides two distinct operator roles: User and Crypto Officer.
2. The module provides identity-based authentication for the Crypto Officer and for the User.
3. The module clears previous authentications on power cycle.
4. An operator does not have access to any cryptographic services prior to assuming an authorized role.
5. The module allows the operator to initiate the pre-operational or conditional self-tests on demand for periodic testing of the module by power cycling or resetting the module.
6. Self-tests do not require any operator action.
7. Data output is inhibited during, pre-operational self-tests, zeroization, and error states.
8. Status information does not contain SSPs or sensitive data that if misused could lead to a compromise of the module.
9. There are no restrictions on which keys or SSPs are zeroized by the zeroization service.
10. The module does not support a maintenance interface or role.
11. The module does not support manual key entry.
12. The module does not have any proprietary external input/output devices used for entry/output of data.
13. The module does not enter or output plaintext SSPs.
14. The module does not output intermediate key values.
15. The module does not support a bypass capability.
16. Firmware upgraded in the non-approved mode cannot be used in the approved mode. (The module enforces the deletion of any firmware upgrade before the approved mode can be entered.)

## Applicable Implementation Guidance

### **2.4.B Tracking the Component Validation List**

The key derivation functions for IKEv1, IKEv2, TLS v1.2 RFC7627, and TLS v1.3 are only used in the context of their respective protocols.

### **C.B Validation Testing of Hash Algorithms and Higher Cryptographic Algorithm Using Hash Algorithms**

Every approved hash algorithm implementation has been CAVP tested as shown in Table 3.

### **C.F RSA Approved Parameter Sizes in FIPS 186-5**

The RSA modulus lengths supported by the module for RSA signature generation are 2048, 3072, and 4096 bits. CAVP testing was performed for the implemented RSA signature algorithm implementation. For FIPS 186-5 signature verification, the module supports the allowed mod sizes of 2048, 3072, 4096. The Miller-Rabin testing rounds are consistent with Table B.1 of FIPS 186-5.

### **C.H Key/IV Pair Uniqueness Requirements from SP 800-38D**

Please see Footnote #1.

### **D.C References to the Support of Industry Protocols**

The KDFs implemented are those described in SP 800-135rev1. (IKEv1, IKEv2, TLS v1.2 RFC7627, and TLS v1.3). All implemented KDFs have been CAVP tested under Cert. #A6598. No parts of the protocols, other than the approved cryptographic algorithms and the KDFs, have been tested by the CAVP and CMVP.

### **D.H Requirements for Vendor Affirmation to SP 800-133r2**

The relevant sections of SP 800-133r2 are Section 4.

#### **Self-Initiated Cryptographic Output**

The module implements a self-initiated cryptographic output capability for IPSec VPN. As part of enabling the service, the Crypto Officer shall configure the IPSec VPN client policy and enable it. Following this, the Crypto Officer shall turn on the "Enable Keep Alive" switch under the "Advanced" tab in the VPN Policy settings.

### 3. Cryptographic Module Interfaces

The module's ports and associated FIPS 140-3 defined logical interface categories are listed in the tables in this section:

Physical Port	Logical Interface <sup>3</sup>	Data that passes over port/interface
MGMT Port	Data Input, Data Output, Status Output and Control Input	Unit administration data
Status LEDs	Status Output	Status
Serial Console Port	Status Output and Control Input	Unit administration data
Ethernet Ports	Data Input, Data Output, Status Output and Control Input (via the external GUI Administration interface)	Network connection data
Safe Mode (bootloader)/Reset Button	Control Input	Used to manually reset the appliance
Power Interface	N/A	N/A

Table 7 – Ports and Interfaces

### 4. Roles, Services, and Authentication

#### Assumption of Roles

The cryptographic module provides the roles of Crypto Officer and User. The cryptographic module does not provide a Maintenance role. The built-in “Administrator” is a member of “SonicWALL Administrators” group on the module, and the name used to login may be configured by the Cryptographic Officer role; the default username for the “Administrator” is “admin”. The User role is authenticated using the credentials of a member of the “Limited Administrators” group. The configuration settings required to enable the Approved mode of operation is specified in Section 2.

The built-in administrator for which the default username is “admin” which is a member of “SonicWALL Administrators” group has full control privilege to query status and configure all firewall configurations including configure other user privilege. Other members of “SonicWALL Administrators” group have the same full control privilege as built-in administrator (part of “SonicWALL Administrators” group). There is another group called “Limited Administrators”. Members of “Limited Administrators” group can query

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<sup>3</sup> Control Output Interface is omitted as it is Not Applicable.

status and non-critical configuration. An operator is granted privilege by the membership of a particular group after login.

<b>Role</b>	<b>Service</b>	<b>Input</b>	<b>Output</b>
CO (referred to as "SonicWALL Administrators" group)	Show Status	Command	Command Response
	Show Non-critical Configuration	Command	Command Response
	Monitor Network Status	Command	Command Response
	Log On	Username and Password or public key	Successful completion of service
	Log Off	Command	Command Response
	Clear Log	Command	Command Response
	Export Log	Command	Command Response
	Import/Export Certificates	Commands and Public Key	Public Key
	Filter Log	Command	Command Response
	Setup DHCP Server	Command	Command Response
	Generate Log Reports	Command	Command Response
	Configure VPN Settings	Commands, Preshared Key	Command Response
	IPsec VPN	SSPs and Encrypted Data	SSPs and Encrypted Data
	TLS	SSPs and Encrypted Data	SSPs and Encrypted Data
	Set Content Filter	Command	Command Response
User (referred to as "Limited Administrators" group)	Configure DNS Settings	Command	Command Response
	Configure Access	Command	Command Response
	Zeroize	Command	Status Output indicating the completion of service.
	Perform Self-tests on-demand	Command	Output display on each algorithm running self-test and pass or fail
	Self-Initiate Cryptographic Output	SSPs and Encrypted Data	SSPs and Encrypted Data
	Show Status	Command	Command Response
	Show Non-critical Configuration	Command	Command Response
	Monitor Network Status	Command	Command Response

Role	Service	Input	Output
	TLS	SSPs and Encrypted Data	SSPs and Encrypted Data
	Configure DNS Settings	Command	Command Response
Unauthenticated	Module Reset	Command	Command Response
	No Auth Function	Command	Command Response
	Show Status (LED/Console)	N/A	N/A
	Perform Self-tests on-demand	Power Cycle	Output display on each algorithm running self-test and pass or fail

Table 8 – Roles, Service Commands, Input and Output

The Module supports concurrent operators. Separation of roles is enforced by requiring operators to authenticate using either a username and password, or digital signature verification. The User role requires the use of a username and password or possession of the private key of a user entity belonging to the “Limited Administrators” group. The Crypto Officer role requires a username and password for authentication.

Multiple users may be logged in simultaneously, but only a single user-session can have full configuration privileges at any time, based upon the prioritized preemption model described below:

1. The Admin user (SonicWALL Administrators) has the highest priority and can preempt any users.
2. The additional operators who are members of the “SonicWALL Administrators” group can preempt any users except for the Admin user.
3. An operator that is a member of the “Limited Administrators” group can only preempt other members of the “Limited Administrators” group.

Session preemption may be handled in one of two ways, configurable from the System > Administration page, under the “On admin preemption” setting:

1. “Drop to non-config mode” – the preempting operator will have three choices:
  - a. “Continue” – this action will drop the existing administrative session to a “non-config mode” and will impart full administrative privileges to the preempting user.
  - b. “Non-Config Mode” – this action will keep the existing administrative session intact and will login the preempting user in a “non-config mode”.
  - c. “Cancel” – this action will cancel the login and will keep the existing administrative session intact.
2. “Log-out” – the preempting user will have three choices:
  - a. “Continue” – this action will log out the existing administrative session and will impart full administrative privileges to the preempting user.
  - b. “Non-Config Mode” – this action will keep the existing administrative session intact and will login the preempting user in a “non-config mode”.
  - c. “Cancel” – this action will cancel the login and will keep the existing administrative session intact.

“Non-config mode” administrative sessions will have no privileges to cryptographic functions making them functionally equivalent to User role sessions. The ability to enter “Non-config mode” may be disabled altogether from the System > Administration page, under the “On admin preemption” setting by selecting “Log out” as the desired action.

## Authentication Methods

The cryptographic module provides authentication relying upon username/passwords or an RSA 2048-bit (at a minimum) digital signature verification.

Role	Authentication Method	Authentication Strength
CO and User password (Identity-based)	Username and Password  (Passwords shall be at least eight (8) characters long, and the password character set is ASCII characters 32-127, which is 96 ASCII characters, hence, the probability is 1 in $96^8$ )	The probability is 1 in $96^8$ , which is less than one in 1,000,000 that a random attempt will succeed, or a false acceptance will occur for each attempt (This is also valid for RADIUS shared secret keys). After three (3) successive unsuccessful password verification tries, the cryptographic module pauses for one second before additional password entry attempts can be reinitiated  This makes the probability approximately $180/96^8 = 2.5E-14$ , which is less than one in 100,000 that a random attempt will succeed, or a false acceptance will occur in a one-minute period
User RSA 2048-bit (minimum) digital signature (Identity-based)	Digital Signature  (A 2048-bit RSA digital signature has a strength of 112-bits; hence the probability is $1/2^{112}$ )	The probability that a random attempt will succeed, or a false acceptance will occur is $1/2^{112}$ , which is less than 1 in 1,000,000. Due to processing and network limitations, the module can verify at most 300 signatures in a one-minute period. Thus, the probability that a random attempt will succeed, or a false acceptance will occur in a one-minute period is $300/2^{112} = 5.8E-32$ , which is less than 1 in 100,000
Unauthenticated	N/A	N/A

Table 9 – Roles and Authentication

## Services

### Crypto Officer Services

The Crypto Officer role is authenticated using the credentials of the “Administrator” user, which is the member of “SonicWALL Administrators” group (also referred to as “Admin”), or the credentials of other members (users) of the “SonicWALL Administrators” group. The use of “SonicWALL Administrators” provides identification of specific users (i.e., by username) upon whom is imparted full administrative privileges. The Cryptographic Officer role can show all status and configure cryptographic algorithms, cryptographic keys, certificates, and servers used for VPN tunnels. The Crypto Officer sets the rules by which the module encrypts, and decrypts data passed through the VPN tunnels. The authentication mechanisms are discussed in Table 9.

The modes of access shown in the table is defined as:

- G = Generate: The module generates or derives the SSP.
- R = Read: The SSP is read from the module (e.g. the SSP is output).
- W = Write: The SSP is updated, imported, or written to the module.
- E = Execute: The module uses the SSP in performing a cryptographic operation.
- Z = Zeroise: The module zeroes the SSP

Service <sup>4</sup>	Description	Approved Security Functions	Keys and/or SSPs	Roles	Access rights to Keys and/or SSPs	Indicator
Show Status	Monitoring, pinging, traceroute, viewing logs	N/A	N/A	Crypto Officer, User, Unauthenticated (LED activity/Console)	N/A	Approved Mode Checkbox Checked in WebUI, Show Status = “FIPS”
Show Non-critical Configuration	“Show” commands that enable the operator to view VPN tunnel status and network configuration parameters	N/A	N/A	Crypto Officer, User	N/A	Approved Mode Checkbox Checked in WebUI, Show Status = “FIPS”

<sup>4</sup> The same services are available in the non-Approved mode of operation. In the non-Approved mode of operation, the non-Approved functions listed in Tables 4 and 5 can be utilized.

Service <sup>4</sup>	Description	Approved Security Functions	Keys and/or SSPs	Roles	Access rights to Keys and/or SSPs	Indicator
Monitor Network Status	Monitor the network status	N/A	N/A	Crypto Officer, User	N/A	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
Crypto Officer Log On	Logs the CO into the module	N/A	Password	Crypto Officer	E	Approved Mode Checkbox Checked in WebUI
User Log On	Logs the User into the module	RSA	Authentication Public Key	User	E	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
Crypto Officer Log Off	Logs the CO off the module	N/A	N/A	Crypto Officer	E	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
User Log Off	Logs the User off the module	N/A	N/A	User	E	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"

Service <sup>4</sup>	Description	Approved Security Functions	Keys and/or SSPs	Roles	Access rights to Keys and/or SSPs	Indicator
Clear Log	Clears session log	N/A	N/A	Crypto Officer	N/A	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
Export Log	Export session log	N/A	N/A	Crypto Officer, User	N/A	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
Import/Export Certificates	Session key management	RSA, ECDSA	Root CA Public Key	Crypto Officer	E, R	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
Filter Log	Session log management	N/A	N/A	Crypto Officer, User	N/A	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
Setup DHCP Server <sup>5</sup>	Setup and configure a DHCP Server	N/A	N/A	Crypto Officer	N/A	Approved Mode Checkbox Checked

Service <sup>4</sup>	Description	Approved Security Functions	Keys and/or SSPs	Roles	Access rights to Keys and/or SSPs	Indicator
						in WebUI, Show Status = "FIPS"
Generate Log Reports	Generate Log Reports	N/A	N/A	Crypto Officer, User	N/A	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
Configure VPN Settings	System configuration, network configuration, Security services including initiating encryption, key management, and VPN tunnels	Shared Secret, RSA or ECDSA	Preshared Key, IKE Private Key, Root CA Public Key, IKE Public Key	Crypto Officer	G, W	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
IPsec VPN	Network traffic over an IPsec VPN	Shared Secret, AES, HMAC, RSA or ECDSA, KAS-FFC-SSC, KAS-ECC-SSC, DRBG	IKE Shared Secret, SKEYID, SKEYID_d, SKEYID_a, SKEYID_e, Preshared Key, IKE Session Encryption Key, IKE Session Authentication Key, IKE Private Key,	Crypto Officer, User	G, W, E	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"

Service <sup>4</sup>	Description	Approved Security Functions	Keys and/or SSPs	Roles	Access rights to Keys and/or SSPs	Indicator
			IPsec Session Encryption Key, Ipsec Session Authentication Key, DH/ECDH Private Key, DRBG V and C values, DRBG seed, Entropy Input, RADIUS Shared Secret, Storage Key			
TLS	TLS used for the https configuration tool or network traffic over a TLS VPN	DRBG, RSA or ECDSA, AES, HMAC, KAS-FFC-SSC, KAS-ECC-SSC	TLS Master Secret, TLS Premaster Secret, TLS Extended Master Secret (TLS 1.2), TLS Private Key, TLS Session Key, TLS Integrity Key, ECDH Private Key, DRBG V and C values, DRBG seed, Entropy Input, TLS Public Key, ECDH Public Key	Crypto Officer, User	G, W, E	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
Set Content Filter	Network configuration settings	N/A	N/A	Crypto Officer	N/A	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"

Service <sup>4</sup>	Description	Approved Security Functions	Keys and/or SSPs	Roles	Access rights to Keys and/or SSPs	Indicator
Configure DNS Settings	Configure DNS Settings	N/A	N/A	Crypto Officer, User	N/A	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
Configure Access	Configure User and Crypto Officer access	Password	Password	Crypto Officer	W	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
Zeroize	Zeroize SSPs	N/A	All SSPs	Crypto Officer	Z	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
Perform Self tests on-demand	Perform Self tests on-demand	N/A	N/A	Crypto Officer, Unauthenticated (power-cycle)	N/A	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"
Self-Initiated Cryptographic Output	This service is enabled for IPSec VPN. As part of enabling this	Shared Secret, HMAC, AES, RSA or ECDSA,	IKE Shared Secret, SKEYID, SKEYID_d, SKEYID_a,	Crypto Officer	G, E	Approved Mode Checkbox Checked in

Service <sup>4</sup>	Description	Approved Security Functions	Keys and/or SSPs	Roles	Access rights to Keys and/or SSPs	Indicator
	service, the CO must configure and enable the IPsec VPN client policy, and then turn on the "Enable Keep Alive" switch under the "Advanced" tab in the VPN Policy settings.	KAS-FFC-SSC, KAS-ECC-SSC, DRBG	SKEYID_e, Preshared Key, IKE Session Encryption Key, IKE Session Authentication Key, IKE Private Key, IPsec Session Encryption Key, Ipsec Session Authentication Key, DH/ECDH Private Key, DRBG V and C values, DRBG seed, Entropy Input, Root CA Public Key, IKE Public Key, Peer IKE Public Key, DH/ECDH Public Key			WebUI, Show Status = "FIPS"
Module Reset	Firmware removal with configuration returned to factory state	N/A	N/A	Unauthenticated	Z	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"

Service <sup>4</sup>	Description	Approved Security Functions	Keys and/or SSPs	Roles	Access rights to Keys and/or SSPs	Indicator
No Auth Function	Power Cycle, Cable Plugin, View LEDs	N/A	N/A	Unauthenticated	N/A	Approved Mode Checkbox Checked in WebUI, Show Status = "FIPS"

Table 10 – Approved Services

Service	Description	Algorithms Accessed	Role	Indicator
Show Status	Monitoring, pinging, traceroute, viewing logs		Crypto Officer, User, Unauthenticated (LED activity/Console)	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Show Non-critical Configuration	"Show" commands that enable the operator to view VPN tunnel status and network configuration parameters		Crypto Officer, User	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Monitor Network Status	Monitor the network status		Crypto Officer, User	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Crypto Officer Log On	Logs the CO into the module		Crypto Officer	Approved Mode Checkbox Unchecked in

Service	Description	Algorithms Accessed	Role	Indicator
				WebUI, Show Status = "NO FIPS"
Crypto Officer Log Off	Logs the CO off the module		Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Clear Log	Clears session log		Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Export Log	Export session Log		Crypto Officer, User	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Import/Export Certificates	Session key management	RSA or DSA	Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Filter Log	Session log management		Crypto Officer, User	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Setup DHCP Server	Setup and configure a DHCP Server		Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"

Service	Description	Algorithms Accessed	Role	Indicator
Generate Log Reports	Generate Log Reports		Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Configure VPN Settings	System configuration, network configuration, Security services including initiating encryption, key management, and VPN tunnels.	RSA or ECDSA	Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
IPsec VPN	Network traffic over an IPsec VPN	AES, HMAC, RSA or ECDSA, KAS-FFC-SSC, KAS-ECC-SSC, DRBG	Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
TLS	TLS used for the https configuration tool or network traffic over a TLS VPN	DRBG, RSA or ECDSA, AES, HMAC, KAS-FFC-SSC, KAS-ECC-SSC	Crypto Officer, User	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Set Content Filter	Network configuration settings		Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Configure DNS Settings	Configure DNS Settings		Crypto Officer, User	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"

Service	Description	Algorithms Accessed	Role	Indicator
Configure Access	Configure User and CO access		Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Zeroize	Zeroize SSPs		Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Perform Self tests on-demand	Perform Self tests on-demand		Crypto Officer, Unauthenticated	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Self-Initiated Cryptographic Output	This service is enabled for IPSec VPN. As part of enabling this service, the CO must configure and enable the IPSec VPN client policy, and then turn on the Enable Keep Alive switch under the Advanced tab in the VPN Policy settings	HMAC, AES, RSA or ECDSA, KAS-FFC-SSC, KAS-ECC-SSC, DRBG	Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
User Log On	Logs the User into the module	RSA	User	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"

Service	Description	Algorithms Accessed	Role	Indicator
User Log Off	Logs the User off the module		User	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Module Reset	Firmware removal with configuration returned to factory state		Unauthenticated	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
No Auth Function	Power Cycle, Cable Plugin, View LEDs		Unauthenticated	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
Firmware Update	Upgrade Module Firmware		Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
SSH	SSH Service	SSH-KDF, SHA2-256, SHA2-512, Hash_DRBG, KAS-ECC-SSC, AES-GCM, RSA SigGen	Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"
SNMP	SNMP Service	SNMP-KDF	Crypto Officer	Approved Mode Checkbox Unchecked in WebUI, Show Status = "NO FIPS"

Table 11 – non-Approved Services

## 5. Software/Firmware Security

The module is a hardware module with firmware (SonicOS/X 7.0.1) running on it. The Module uses SHA2-256 (Cert. #A6598) performed over all module firmware as the integrity technique/EDC. The operator can initiate the integrity test on demand by power cycling the module. The temporary values generated during the integrity test are cleared automatically by the module from the memory after the test is completed.

The module does not support the external loading of firmware in the Approved mode of operation.

## 6. Operational Environment

The module operates in a non-modifiable operational environment per FIPS 140-3 specifications, as the module does not support external firmware loading.

## 7. Physical Security

The chassis of the multi-chip standalone cryptographic modules are opaque within the visible spectrum, and direct observation of the modules' internal components is not possible. The chassis are sealed with either 1 or 2 tamper-evident seals (depending on model), applied during manufacturing. The physical security of the module is intact if there is no evidence of tampering with the tamper-evident seal(s).

Physical Security Mechanism	Recommended Frequency of Inspection	Inspection Guidance Details
Tamper-evident seals	Periodic inspection of tamper-evident seals once every 6 months	If evidence of tamper is found, the Cryptographic Officer is requested to follow their internal IT policies, which may include contacting SonicWALL for replacing the unit

Table 12 – Physical Security Inspection Guidelines

Table 13 below lists the number of tamper-evident seals applied per model:

#	Model	Number of tamper-evident seals(s)/module
1	NSa 4700	341-000041-51 (1pcs) and 341-000029-51 (1pcs)
2	NSa 5700	341-000041-51 (1pcs) and 341-000029-51 (1pcs)
3	NSa 6700	341-000041-51 (1pcs) and 341-000029-51 (1pcs)
4	NSsp 10700	341-000041-51 (1pcs) and 341-000029-51 (2pcs)
5	NSsp 11700	341-000041-51 (1pcs) and 341-000029-51 (2pcs)
6	NSsp 13700	341-000041-51 (1pcs) and 341-000029-51 (2pcs)

Table 13 – Number of Tamper-Evident Seals

The locations of the tamper-evident seals (highlighted by red rectangles) are indicated in Figure 10 (below):

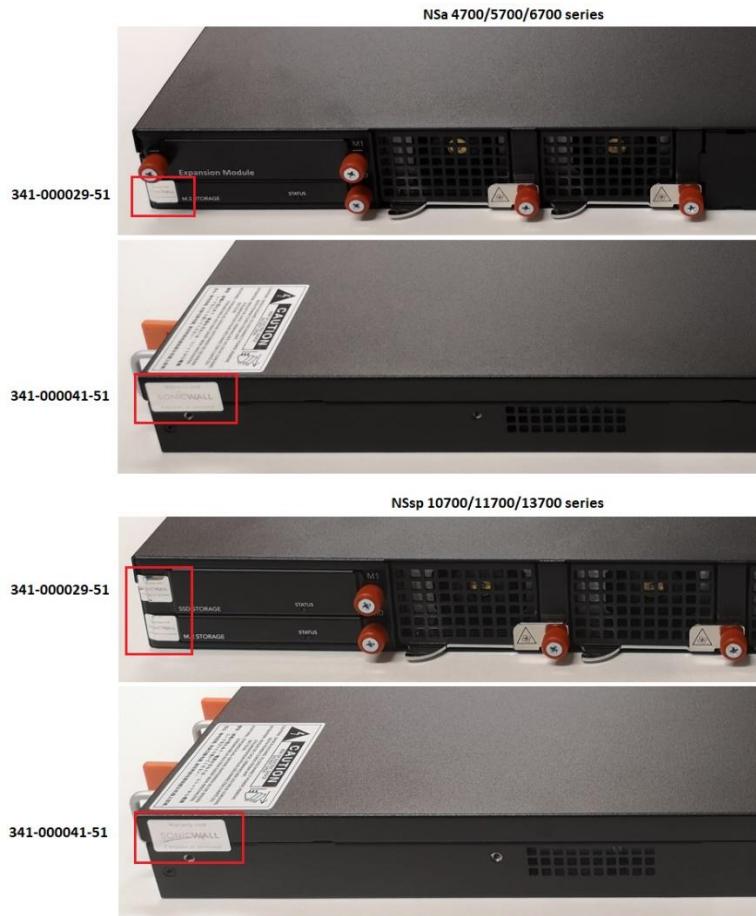


Figure 10. Tamper-evident seal placements for NSa 4700/5700/6700 and NSsp 10700/11700/13700

## 8. Non-Invasive Security

Not Applicable. The module does not implement non-invasive security measures.

## 9. Sensitive Security Parameter Management

All SSPs used by the Module are described in this section.

Key/SSP Name/Type	Strength	Security Function and Cert. Number	Generation	Import/Export	Establishment	Storage	Zeroisation	Use & related keys
IKE Shared Secret	String: 32 - 256 bytes	Shared Secret A6598	Generated Internally	Neither Input nor Output	Established as a part of IKE exchange process	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or IKE session termination	Shared secret used during IKE Phase 1
SKEYID	256, 384 or 512-bits	IKE KDF HMAC A6598	Generated Internally	Neither Input nor Output	Established as a part of IKE exchange process	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or IKE session termination	Secret value used to derive other IKE secrets
SKEYID_d	256, 384 or 512-bits	IKE KDF HMAC A6598	Generated Internally	Neither Input nor Output	Established as a part of IKE exchange process	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or IKE session termination	Secret value used to derive keys for security associations
SKEYID_a	256, 384 or 512-bits	IKE KDF HMAC A6598	Generated Internally	Neither Input nor Output	Established as a part of IKE exchange process	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or IKE session termination	Secret value used to derive keys to authenticate IKE messages

Key/SSP Name/Type	Strength	Security Function and Cert. Number	Generation	Import/Export	Establishment	Storage	Zeroisation	Use & related keys
SKEYID_e	256, 384 or 512-bits	IKE KDF HMAC A6598	Generated Internally	Neither Input nor Output	Established as a part of IKE exchange process	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or IKE session termination	Secret value used to derive keys to encrypt IKE messages
Preshared Key	A minimum of 8 characters	IKE KDF A6598	Not Applicable	Input electronically	Not Applicable	Flash (Encrypted by AES CBC 256-bit)	Zeroize Service	Used to authenticate the module to a peer during IKE
IKE Session Encryption Key	128, 192 or 256-bit	IKE KDF AES (CBC) A6598	Generated Internally during SSP establishment	Neither Input nor Output	Established as a part of IKE exchange process (SP800-56a rev3 and SP800-135 KDF)	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or IKE session termination	Used to establish phase 2 tunnel
IKE Session Authentication Key	256, 384 or 512-bits	IKE KDF HMAC A6598	Generated Internally during SSP establishment	Neither Input nor Output	Established as a part of IKE exchange process (SP800-56a rev3 and SP800-135 KDF)	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or IKE session termination	Used to establish phase 2 tunnel
IKE Private Key	2048-bit or P-256, P-384 or P-521	RSA or ECDSA CKG A6598	Generated as per SP800-90A DRBG and FIPS 186-5 compliant RSA or ECDSA key generation	Neither Input nor Output	Not Applicable	Flash (Plaintext)	Zeroize Service	Used as a part of IKE process

Key/SSP Name/Type	Strength	Security Function and Cert. Number	Generation	Import/Export	Establishment	Storage	Zeroisation	Use & related keys
IPsec Session Encryption Key	128, 192 or 256-bit	AES (CBC) A6598	Generated Internally during SSP establishment	Neither Input nor Output -	Established as a part of IKE exchange process (SP800-56a rev3 and SP800-135 KDF)	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or IPsec session termination	Used to encrypt data
IPsec Session Authentication Key	256, 384 or 512-bits	HMAC A6598	Generated Internally during SSP establishment	Neither Input nor Output	Established as a part of IKE exchange process (SP800-56a rev3 and SP800-135 KDF)	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or IPsec session termination	Used for data authentication for IPsec traffic
TLS Master Secret	384-bits	TLS A6598	Generated Internally during TLS handshake process	Neither Input nor Output	Established as a part of TLS handshake process	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or the TLS session termination	Used for the generation of TLS Session Keys and TLS Integrity Key
TLS Extended Master Secret	384-bits	TLS 1.2 A6598	Generated Internally during TLS handshake process	Neither Input nor Output	Established as a part of TLS handshake process	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or the TLS session termination	Binds the master secret to the full handshake context
TLS Premaster Secret	384-bits	TLS A6598	Generated Internally during TLS handshake process	Neither Input nor Output	Established as a part of TLS handshake process	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or the TLS	Used for the generation of Master Secret

Key/SSP Name/Type	Strength	Security Function and Cert. Number	Generation	Import/Export	Establishment	Storage	Zeroisation	Use & related keys
							session termination	
TLS Session Key	TLS 1.2: 128 or 256-bit and 128 or 256-bit  TLS 1.3: 128 or 256-bit	TLS 1.2: AES CBC  AES GCM  TLS 1.3: AES-GCM  A6598	Generated Internally during SSP establishment	Neither Input nor Output	Established as a part of TLS exchange process (SP800-56a rev3 and SP800-135 KDF/TLS 1.3 KDF)	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or the TLS session termination	Used to protect TLS 1.2 connection  Used to protect TLS 1.3 connection
TLS Integrity Key	TLS 1.2: 160/256/384-bit  TLS 1.3: 256/384-bit	TLS 1.2/ TLS 1.3  HMAC  A6598	Generated Internally during SSP establishment	Neither Input nor Output	Established as a part of TLS exchange process (SP800-56a rev3 and SP800-135 KDF/TLS 1.3 KDF)	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or the TLS session termination	Used to check the integrity of TLS 1.2 connection  Used to check the integrity of TLS 1.3 connection
TLS Private Key	2048-bit or P-256, P-384 or P-521	RSA or ECDSA  CKG  A6598	Generated as per SP800-90A DRBG and FIPS 186-5 compliant RSA or ECDSA key generation	Neither Input nor Output	Not Applicable	Flash (Plaintext)	Zeroize Service	Used in the TLS 1.2/TLS 1.3 signature algorithm
Diffie-Hellman/EC	IKE: Diffie-Hellman Private Key	KAS-SSC  CKG  A6598	Generated as per SP800-90A DRBG and FIPS 186-4 compliant	Neither Input nor Output	Not Applicable	Temporarily in RAM	Zeroize Service, Power	Used within IKE key agreement

Key/SSP Name/Type	Strength	Security Function and Cert. Number	Generation	Import/Export	Establishment	Storage	Zeroisation	Use & related keys
Diffie-Hellman Private Key	(N = 224, 256) or EC DH P-256/P-384/P-521  TLS: EC DH P-256/P-384/P-521		DSA or 186-5 compliant ECDSA key generation			(Plaintext)	Cycle or the TLS/IKE session termination	Used within TLS key agreement
DRBG Internal State	256-bits	Hash_DRBG A6598	Generated Internally	Neither Input nor Output	Not Applicable	Temporarily in RAM (Plaintext)	Zeroize Service or Power Cycle	The values of V and C are the “secret values” of the internal state
DRBG Seed	256-bits	Hash_DRBG A6598	Intel® Digital Random Number Generator SP800-90B	Neither Input nor Output	Not Applicable	Temporarily in RAM (Plaintext)	Zeroize Service or Power Cycle	Used to seed the Approved DRBG
Entropy Input	256-bits security strength	Hash_DRBG A6598	Intel® Digital Random Number Generator SP800-90B	Neither Input nor Output	Not Applicable	Temporarily in RAM (Plaintext)	Zeroize Service or Power Cycle	Entropy (min) input used to instantiate the DRBG
RADIUS Shared Secret	A minimum of 8 characters for RADIUS authentication	Shared Secret A6598	Not Applicable	Input electronically and output via IPsec	Not Applicable	Flash (Encrypted by AES CBC 256-bit)	Zeroize Service	Used for authenticating the RADIUS server to the module and vice versa via IPSec

Key/SSP Name/Type	Strength	Security Function and Cert. Number	Generation	Import/Export	Establishment	Storage	Zeroisation	Use & related keys
Passwords (hashed)	A minimum of 8 ASCII characters.	Not Applicable	Not Applicable	Entered electronically	Not Applicable	Flash (Encrypted by AES CBC 256-bit)	Zeroize Service	Authentication data
Storage Key	256-bit Key	AES CBC CKG A6598	Generated as per SP800-90A DRBG	Neither Input nor Output	Not Applicable	Flash (Plaintext)	Zeroize Service	For encrypting RADIUS Shared Secret, Passwords and Preshared Key
<b>Public Keys</b>								
Root CA Public Key	2048-bit or P-256, P-384 or P-521	RSA or ECDSA A6598	Not Applicable	Input electronically via IPsec. Not output	Not Applicable	Flash (Plaintext)	Zeroize Service	Used for verifying a chain of trust for receiving certificates
Peer IKE Public Key	2048-bit or P-256, P-384 or P-521	RSA or ECDSA A6598	Not Applicable	Input electronically Not output	During IKE negotiation	RAM (Plaintext)	Zeroize Service, Power Cycle or IKE session termination	Used for verifying digital signatures from a peer device
IKE Public Key	2048-bit or P-256, P-384 or P-521	RSA or ECDSA A6598	Generated as per SP800-90A DRBG and FIPS 186-5 compliant RSA or ECDSA key generation	Not Input. Output electronically during IKE negotiation	During IKE negotiation	Flash (Plaintext)	Zeroize Service	Used for verifying digital signatures from a peer device

Key/SSP Name/Type	Strength	Security Function and Cert. Number	Generation	Import/Export	Establishment	Storage	Zeroisation	Use & related keys
Diffie-Hellman/EC Diffie-Hellman Public Key	IKE: Diffie-Hellman Public Key (N = 224, 256) or EC DH P-256/P-384/P-521  TLS: EC DH P-256/P-384/P-521	KAS-SSC A6598	Generated as per SP800-90A DRBG and FIPS 186-4 compliant DSA or 186-5 compliant ECDSA key generation	Not Input. Electronic output during IKE negotiation	During IKE negotiation	Temporarily in RAM (Plaintext)	Zeroize Service, Power Cycle or the TLS/IKE session termination	Used within IKE key agreement  Used within TLS key agreement
Authentication Public Key	2048-bit	RSA A6598	Not Applicable	Input electronically over CLI. No output	Not Applicable	Temporarily in RAM (Plaintext)	Zeroize Service	Used to authenticate the User
TLS Public Key	2048-bit or P-256, P-384 or P-521	RSA or ECDSA A6598	Generated as per SP800-90A DRBG and FIPS 186-5 compliant RSA or ECDSA key generation	Electronically Output during TLS handshake	During TLS Handshake	Flash (Plaintext)	Zeroize Service	Used in the TLS handshake

Table 14 – SSPs

**Note:** The keys are explicitly zeroized by the module when the zeroize service is executed and are implicitly zeroized when power cycling or the termination of the IPsec, IKE, and/or TLS sessions.

Entropy sources	Minimum number of bits of entropy	Details
Intel® Digital Random Number Generator SP800-90B  <a href="#"><u>ESV Certificate: E164</u></a>	0.6	<p>The module supports the Intel® Digital Random Number Generator SP800-90B as the module's noise source, outputting full entropy. (The entropy source supports a vetted conditioning component consistent with NIST SP 800-90B, Section 3.1.5.1.1.) The noise source is the root of security for the entropy source and for the DRBG as a whole</p> <p>The noise source (internal to the Intel CPUs) is a circuit that employs a feedback-stabilized metastable latch to generate entropic binary data by measuring the resolution state of the latch after exiting metastability. The feedback is used to keep the metastable latch balanced so that thermal noise will drive the resolution process</p>

Table 15 – Non-Deterministic Random Number Generator Specification

## 10. Self-Tests

The module performs self-tests to ensure the proper operation of the module. Per FIPS 140-3 these are categorized as either pre-operational self-tests or conditional self-tests. The pre-operational self-tests are performed and shall pass successfully prior to the module providing any data output via the data output interface. CASTs are performed on the condition that the pre-operational self-test complete successfully. Other conditional self-tests are performed when an applicable security function or process is invoked. If the module fails a self-test, the module enters the error state and outputs the error message. The module does not perform any cryptographic operations, and data output is inhibited while in the error state.

Self-tests (CASTs) are available on demand by power cycling the module.

### Pre-Operational Self-Tests

- Firmware Integrity Test: SHA2-256 (256-bit EDC)

### Conditional Self-Tests

#### Cryptographic Algorithm Self Tests

- AES-CBC Decrypt CAST
- AES GCM Encrypt CAST
- AES GCM Decrypt CAST
- CVL: IKEv1 KDF CAST
- CVL: IKEv2 KDF CAST
- CVL: TLS 1.2 KDF CAST
- CVL: TLS 1.3 KDF CAST
- DRBG: SP 800-90A Section 11.3 Health Tests (Instantiate, Generate, Reseed)
- DSA CAST (Pairwise Consistency Test)
- ECDSA Signature Generation CAST
- ECDSA Signature Verification CAST
- HMAC-SHA-1 CAST
- HMAC-SHA2-256 CAST
- HMAC-SHA2-384 CAST
- HMAC-SHA2-512 CAST
- KAS-FFC-SSC Primitive “Z” CAST (SP 800-56Arev3)
- KAS-ECC-SSC Primitive “Z” CAST (SP 800-56Arev3)
- RSA Signature Generation CAST (Key size: 2048)
- RSA Signature Verification CAST (Key size: 2048)
- SHA-1 CAST
- SHA2-256 CAST
- SHA2-384 CAST
- SHA2-512 CAST
- NIST SP 800-90B Start-Up Health Tests
- NIST SP 800-90B Continuous Health Tests

### Conditional Pairwise Consistency Tests

- ECDSA Pairwise Consistency Test
- DSA Pairwise Consistency Test
- RSA Pairwise Consistency Test

If any of the tests described above fail, the cryptographic module enters the error state. No security services are provided in the error state. No cryptographic output is started until all tests are successfully completed. This effectively inhibits the data output interface. When all tests are completed successfully, the Test LED is turned off.

## 11. Life-Cycle Assurance

### Crypto Officer Guidance

The following steps shall be performed by the Crypto Officer (CO) to configure the required roles and place the module in the Approved mode of operation:

1. Apply power to the module. On a GPC, connect to the module's console using the serial port. The network interface drivers/login prompt will only be available once all power-up self-tests have completed successfully.
2. Login using the vendor provided default login and password. The default password and login shall be changed/updated.
3. Configure management IP address and Gateway.
4. Over the web interface, proceed to system settings and update the settings to be consistent with Section 2 of this document with the assistance of compliance checking procedure and then enabling Approved mode using the checkbox. The FIPS checkbox does not place the module in Approved mode until the settings in the Modes of Operation Section are met. Then click OK. The system automatically restarts.
5. Observe that the module self-tests execute automatically before a log in is possible. Observe that the "FIPS enabled checkbox" is checked/enabled to indicate that the module is in the Approved mode of operation. This can be verified in the system/settings page. In addition, on the dashboard, the operator can verify the version of the module.
6. Proceed to create the roles specified in Section 4 of this document. Passwords and Digital signatures required for authentication to each role should be configured or installed as appropriate.

\*Note 1: When the "Approved mode" checkbox is selected, the module executes a compliance checking procedure, examining all settings related to the security rules described previously in this document. The operator is responsible for updating these settings appropriately during setup and will be prompted by the compliance tool if a setting has been modified, taking the module out of compliance. The "Approved mode" checkbox and corresponding system flag ("fips") which can be queried over the console will not be

set unless all settings are compliant. The "Approved mode" checkbox and "fips" system flag are indicators that the module is running in the Approved mode of operation.

\*Note 2: The keys and SSPs generated in the cryptographic module during Approved mode of operation shall not be used when the module transitions to non-Approved mode and vice versa. While the module transitions from Approved to non-Approved mode or from non-Approved to Approved mode, all SSPs shall be zeroized by the Crypto Officer using the "Zeroize" service. If transitioning from the non-Approved to Approved mode, the CO shall zeroize all plaintext keys and SSPs by issuing "Zeroize" service and then the CO shall follow the CO Guidance (above) in this section to place the module in Approved mode of operation.

#### Configuration Management

SonicWall uses Perforce software for the management of source code artifacts and for hardware and documentation version control.

KlocWork is used for static code analysis.

The module is developed using high level programming languages C++ and C. Assembly code is only used for select performance enhancements.

The module is securely delivered from Sonicwall to customers via the mechanism specified by the customer. FedEx, UPS, or any other freight forwarder of their choice can be utilized. Tracking numbers are used to track and confirm delivery to the authorized operator. The Crypto Officer should check the package for any irregular tears or openings. If the Crypto Officer suspects tampering has occurred, they should immediately contact Sonicwall, Inc.

The end of life for the module meets the FIPS 140-3 requirements. The sanitization requirements are met by zeroising the module.

## **12. Mitigation of Other Attacks**

The SonicWall NSa 4700, NSa 5700, NSa 6700, NSsp 10700, NSsp 11700, and NSsp 13700 are capable of mitigating other attacks using the following features (dependent on licensing).

### **Capture ATP**

The Capture ATP Service revolutionizes advanced threat detection and sandboxing with a cloud-based, multi-engine solution for stopping unknown and zero-day attacks at the gateway. Capture ATP blocks zero-day attacks before they enter your network. It lets you establish advanced protection against the changing threat landscape and analyze a broad range of file types.

### **Gateway Anti-Virus**

ICSA-certified Gateway Anti-Virus protection combines network-based anti-malware with a dynamically updated cloud database of tens of millions of malware signatures. Dynamic spyware protection blocks the installation of malicious spyware and disrupts existing spyware communications.

### **IPS**

Cutting-edge IPS technology protects against worms, trojans, software vulnerabilities and other intrusions by scanning all network traffic for malicious or anomalous patterns, thereby increasing network reliability and performance.

### **Comprehensive Anti-Spam Service**

SonicWall Comprehensive Anti-Spam Service offers small-to medium sized businesses >99% effectiveness against spam, dropping >80% of spam at the gateway, while utilizing advanced anti-spam techniques like Adversarial Bayesian™ and machine-learning filtering.

### **DNS Filtering**

DNS filtering blocks malicious websites or applications at the DNS layer to filter out harmful or inappropriate content without enabling TLS decryption and adversely affecting performance.

### **Network Access Control**

Network access control integration provides network access control for SonicWall customers by integrating with Aruba ClearPass, giving you comprehensive and precise profiling, authentication, and authorization for systems and devices trying to access your IT resources. SonicOS provides a RESTful API that will support Aruba ClearPass as NAC to integrate with SonicWall NGFW. This architecture will turn static security into contextual security to provide more flexible and advanced security protection.

### **Content Filtering Service**

Content Filtering Services (CFS) lets you enforce Internet use policies and control internal access to inappropriate, unproductive and potentially illegal web content with comprehensive content filtering. Reputation-based CFS 5.0 provides a reputation score that forecasts the security risk of a URL across 93 web categories.

## **Other**

The modules also include basic DNS security, deep packet inspection for SSL, and a botnet service.

## References and Definitions

The following standards are referred to in this Security Policy.

Abbreviation	Full Specification Name
[FIPS140-3]	<a href="#"><u>Security Requirements for Cryptographic Modules</u></a> , March 22, 2019
[IG]	<a href="#"><u>Implementation Guidance for FIPS PUB 140-3 and the Cryptographic Module Validation Program</u></a>
[108]	<a href="#"><u>NIST Special Publication 800-108, Recommendation for Key Derivation Using Pseudorandom Functions (Revised)</u></a> , October 2009
[131Arev2]	<a href="#"><u>Transitions: Recommendation for Transitioning the Use of Cryptographic Algorithms and Key Lengths</u></a> , March 2019
[132]	<a href="#"><u>NIST Special Publication 800-132, Recommendation for Password-Based Key Derivation, Part 1: Storage Applications</u></a> , December 2010
[133rev2]	<a href="#"><u>NIST Special Publication 800-133rev2, Recommendation for Cryptographic Key Generation</u></a> , June 2020
[135rev1]	<a href="#"><u>National Institute of Standards and Technology, Recommendation for Existing Application-Specific Key Derivation Functions, Special Publication 800-135rev1</u></a> , December 2011.
[186-4]	<a href="#"><u>National Institute of Standards and Technology, Digital Signature Standard (DSS), Federal Information Processing Standards Publication 186-4</u></a> , July, 2013.
[186-5]	<a href="#"><u>National Institute of Standards and Technology, Digital Signature Standard (DSS), Federal Information Processing Standards Publication 186-5</u></a> , February 2023
[186-2]	<a href="#"><u>National Institute of Standards and Technology, Digital Signature Standard (DSS), Federal Information Processing Standards Publication 186-2</u></a> , January 2000.
[197]	<a href="#"><u>National Institute of Standards and Technology, Advanced Encryption Standard (AES), Federal Information Processing Standards Publication 197</u></a> , November 26, 2001
[198]	<a href="#"><u>National Institute of Standards and Technology, The Keyed-Hash Message Authentication Code (HMAC), Federal Information Processing Standards Publication 198-1</u></a> , July, 2008
[180-4]	<a href="#"><u>National Institute of Standards and Technology, Secure Hash Standard, Federal Information Processing Standards Publication 180-4</u></a> , August, 2015
[202]	<a href="#"><u>FEDERAL INFORMATION PROCESSING STANDARDS PUBLICATION, SHA-3 Standard: Permutation-Based Hash and Extendable-Output Functions, FIPS PUB 202</u></a> , August 2015
[38A]	<a href="#"><u>National Institute of Standards and Technology, Recommendation for Block Cipher Modes of Operation, Methods and Techniques, Special Publication 800-38A</u></a> , December 2001

Abbreviation	Full Specification Name
[38B]	<a href="#"><u>National Institute of Standards and Technology, Recommendation for Block Cipher Modes of Operation: The CMAC Mode for Authentication, Special Publication 800-38B, May 2005 (Updated 10/6/2016)</u></a>
[38C]	<a href="#"><u>National Institute of Standards and Technology, Recommendation for Block Cipher Modes of Operation: The CCM Mode for Authentication and Confidentiality, Special Publication 800-38C, May 2004 (Updated 7/20/2007)</u></a>
[38D]	<a href="#"><u>National Institute of Standards and Technology, Recommendation for Block Cipher Modes of Operation: Galois/Counter Mode (GCM) and GMAC, Special Publication 800-38D, November 2007</u></a>
[56Arev3]	<a href="#"><u>NIST Special Publication 800-56A (rev3), Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography, April 2018</u></a>
[56Br2]	<a href="#"><u>NIST Special Publication 800-56B Revision 1, Recommendation for Pair-Wise Key Establishment Schemes Using Integer Factorization Cryptography, March 2019</u></a>
[67rev2]	<a href="#"><u>National Institute of Standards and Technology, Recommendation for the Triple Data Encryption Algorithm (TDEA) Block Cipher, Special Publication 800-67, November 2017</u></a>
[90Arev1]	<a href="#"><u>National Institute of Standards and Technology, Recommendation for Random Number Generation Using Deterministic Random Bit Generators, Special Publication 800-90A, June 2015.</u></a>
[90B]	<a href="#"><u>Recommendation for the Entropy Sources Used for Random Bit Generation, January 2018</u></a>

Table 16 – References

Acronym	Definition
AES	Advanced Encryption Standard
CBC	Cipher Block Chaining
DH	Diffie-Hellman
DRBG	Deterministic Random Bit Generator
FIPS	Federal Information Processing Standard
GUI	Graphical User Interface
HMAC	Hashed Message Authentication Code
IKE	Internet Key Exchange
IPSec	Internet Protocol Security
RADIUS	Remote Authentication Dial-In User Service
RSA	Rivest, Shamir, Adleman asymmetric algorithm
SHA	Secure Hash Algorithm

Acronym	Definition
SSP	Sensitive Security Parameter
TACACS+	Terminal Access Controller Access-Control System Plus
Triple-DES	Triple Data Encryption Standard
VPN	Virtual Private Network

Table 17 – Acronyms and Definitions