McAfee, Inc.

McAfee Web Gateway WG5000 and WG5500 Appliances

Hardware Models: 5000, 5500; Firmware Version: 7.1.0

FIPS 140-2 Non-Proprietary Security Policy

FIPS Security Level: 2
Document Version: 1.4

Prepared for:

McAfee, Inc.
3965 Freedom Circle
Santa Clara, California 95054
USA

Phone: +1 (888) 847-8766
http://www.mcafee.com

Prepared by:

Corsec Security, Inc.
13135 Lee Jackson Memorial Highway, Suite 220
Fairfax, Virginia 22033
USA

Phone: +1 (703) 267-6050
Email: info@corsec.com

Table of Contents

1 INTRODUCTION 4
1.1 PURPOSE 4
1.2 REFERENCES 4
1.3 DOCUMENT ORGANIZATION 4
2 MCAFEE WEB GATEWAY WG5000 AND WG5500 APPLIANCES 5
2.1 OVERVIEW 5
2.2 MODULE SPECIFICATION 7
2.3 MODULE INTERFACES 9
2.4 ROLES AND SERVICES 12
2.4.1 Crypto-Officer Role *12*
2.4.2 User Role *12*
2.4.3 Services *12*
2.4.4 Unauthenticated Operator Services *15*
2.4.5 Authentication Mechanisms *15*
2.5 PHYSICAL SECURITY 16
2.6 OPERATIONAL ENVIRONMENT 16
2.7 CRYPTOGRAPHIC KEY MANAGEMENT 17
2.8 EMI/EMC 20
2.9 SELF-TESTS 20
2.9.1 Power-Up Self-Tests *20*
2.9.2 Conditional Self-Tests *21*
2.10 MITIGATION OF OTHER ATTACKS 21
3 SECURE OPERATION 22
3.1 INITIAL SETUP 22
3.1.1 Setting FIPS Environment *22*
3.1.2 Applying Tamper-Evident Labels *23*
3.1.3 Power Supply Replacement *27*
3.2 CRYPTO-OFFICER GUIDANCE 27
3.2.1 Management *27*
3.2.2 Zeroization *27*
3.3 USER GUIDANCE 28
4 ACRONYMS 29

Table of Figures

FIGURE 1 – MCAFEE WEB GATEWAY WG5000 (TOP) AND WG5500 (BOTTOM) 5
FIGURE 2 – TYPICAL DEPLOYMENT SCENARIO 6
FIGURE 3 – BLOCK DIAGRAM FOR THE WG 5000 AND WG 5500 8
FIGURE 4 – MCAFEE WEB GATEWAY 5000 (FRONT VIEW) 9
FIGURE 5 – MCAFEE WEB GATEWAY 5500 (FRONT VIEW) 9
FIGURE 6 – MCAFEE WEB GATEWAY 5000 (REAR VIEW) 9
FIGURE 7 – MCAFEE WEB GATEWAY WG5000 (REAR VIEW) 10
FIGURE 8 – WG5000 FRONT BEZEL LABEL PLACEMENT (TOP) 23
FIGURE 9 – WG5000 REMOVABLE PANEL LABEL PLACEMENT 24
FIGURE 10 – WG5000 FRONT BEZEL LABEL PLACEMENT (BOTTOM) 24
FIGURE 11 - WG5500 FRONT BEZEL LABEL PLACEMENT (TOP) 25
FIGURE 12 – WG5500 REMOVABLE PANEL LABEL PLACEMENT 25
FIGURE 13 – WG5500 FRONT BEZEL LABEL PLACEMENT (BOTTOM) 26
FIGURE 14 – WG5000 POWER SUPPLY LABELS PLACEMENT 26
FIGURE 15 – WG5500 POWER SUPPLY LABELS PLACEMENT 27

List of Tables...

TABLE 1 – MCAFEE WEB GATEWAY MODEL SPECIFICATIONS..7
TABLE 2 – SECURITY LEVEL PER FIPS 140-2 SECTION 7
TABLE 3 – LED DESCRIPTIONS.. 10
TABLE 4 – MCAFEE WEB GATEWAY PORTS AND INTERFACES 11
TABLE 5 – FIPS 140-2 LOGICAL INTERFACE MAPPINGS 11
TABLE 6 – AUTHENTICATED SERVICES 12
TABLE 7 – UNAUTHENTICATED OPERATOR SERVICE 15
TABLE 8 – AUTHENTICATION MECHANISMS EMPLOYED BY THE MODULE 16
TABLE 9 – ALGORITHM CERTIFICATE NUMBERS FOR CRYPTOGRAPHIC LIBRARIES.. 17
TABLE 10 – LIST OF CRYPTOGRAPHIC KEYS, CRYPTOGRAPHIC KEY COMPONENTS, AND CSPS 18
TABLE 11 – ACRONYMS 29

1 Introduction

1.1 Purpose

This is a non-proprietary Cryptographic Module Security Policy for the McAfee Web Gateway WG5000 and WG5500 Appliances from McAfee, Inc. This Security Policy describes how the McAfee Web Gateway WG5000 and WG5500 Appliances meet the security requirements of Federal Information Processing Standards (FIPS) Publication 140-2, which details the U.S. and Canadian Government requirements for cryptographic modules. More information about the FIPS 140-2 standard and validation program is available on the National Institute of Standards and Technology (NIST) and the Communications Security Establishment Canada (CSEC) Cryptographic Module Validation Program (CMVP) website at http://csrc.nist.gov/groups/STM/cmvp.

This document also describes how to run the module in a secure FIPS-Approved mode of operation. This policy was prepared as part of the Level 2 FIPS 140-2 validation of the module. The McAfee Web Gateway WG5000 and WG5500 Appliances are referred to in this document collectively as the McAfee Web Gateway, the appliance, or the module.

1.2 References

This document deals only with operations and capabilities of the module in the technical terms of a FIPS 140-2 cryptographic module security policy. More information is available on the module from the following sources:

- The McAfee corporate website (http://www.mcafee.com) contains information on the full line of products from McAfee.
- The CMVP website (http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/140val-all.htm) contains contact information for individuals to answer technical or sales-related questions for the module.

1.3 Document Organization

The Security Policy document is one document in a FIPS 140-2 Submission Package. In addition to this document, the Submission Package contains:

- Vendor Evidence document
- Finite State Model document
- Validation Submission Summary document
- Other supporting documentation as additional references

This Security Policy and the other validation submission documentation were produced by Corsec Security, Inc. under contract to McAfee. With the exception of this Non-Proprietary Security Policy, the FIPS 140-2 Submission Package is proprietary to McAfee and is releasable only under appropriate non-disclosure agreements. For access to these documents, please contact McAfee.

2 McAfee Web Gateway WG5000 and WG5500 Appliances

2.1 Overview

McAfee, Inc. is a global leader in Enterprise Security solutions. The company's comprehensive portfolio of network security products and solutions provides unmatched protection for the enterprise in the most mission-critical and sensitive environments.

The McAfee Web Gateway is a high-performance, enterprise-strength proxy appliance family that provides the caching, authentication, administration, and authorization controls required by today's most demanding enterprises. With multiple appliance models to choose from, the McAfee Web Gateway WG5000 and WG5500 Appliances deliver deployment flexibility and performance, along with scalability to easily support hundreds of thousands of users in a single environment. McAfee Web Gateway WG5000 and WG5500 Appliances deliver comprehensive security for all aspects of Web 2.0 traffic. A front view of the Model WG5000 is shown in Figure 1 below.

Figure 1 – McAfee Web Gateway WG5000 (top) and WG5500 (bottom)

The McAfee Web Gateway ensures comprehensive web security for networks. It protects networks against threats arising from the web, such as viruses and other malware, inappropriate content, data leaks, and related issues. It also ensures regulatory compliance and a productive work environment.

The appliance is installed as a gateway that connects a network to the web. Following the implemented web security rules, it filters the requests that users send to the web from within the network. Responses sent back from the web and embedded objects sent with requests or responses are also filtered. Malicious and inappropriate content is blocked, while useful content is allowed to pass through.

Web filtering is accomplished via the following appliance processes:

- Intercepting web traffic – This is achieved by the gateway functions of the appliance, using different network protocols, such as HTTP[1], HTTPS[2], FTP[3], Yahoo, ICQ, Windows Live Messenger, and others. As a gateway, the appliance can run in explicit proxy mode or in transparent bridge or router mode.

- Filtering web objects – Special anti-virus and anti-malware functions on the appliance scan and filter web traffic and block objects when they are infected. Other functions filter requested URLs[4], using information from the global TrustedSource intelligence system, or do media type

[1] HTTP – Hypertext Transfer Protocol
[2] HTTPS – Secure Hypertext Transfer Protocol
[3] FTP – File Transfer Protocol
[4] URL – Uniform Resource Locator

and HTML[5] filtering. They are supported by functions that do not filter themselves, but do such jobs as counting user requests or indicating the progress made in downloading web objects.

- Filtering users – This is done by the authentication mechanisms provided by the appliance, using information from internal and external databases and methods such as NTLM[6], LDAP[7], RADIUS[8], Kerberos, and others. In addition to filtering normal users, the appliance also provides control over administrator rights and responsibilities.

- Monitoring the filtering process – The monitoring functions of the appliance allow administrators a continuous overview of the filtering process. They include a dashboard, providing information on web usage, filtering activities, and system behavior, as well as logging and tracing functions and options to forward data to an ePolicy Orchestrator or do event monitoring with an SNMP[9] agent.

For user-initiated web requests, the McAfee Web Gateway first enforces an organization's Internet use policy. For all allowed traffic, it then uses local and global techniques to analyze the nature and intent of all content and active code entering the network via the requested web pages, providing immediate protection against malware and other hidden threats. Additionally, the SSL[10] Scanner module of the McAfee Web Gateway can examine SSL traffic to provide in-depth protection against malicious code that has been disguised through encryption.

To secure outbound traffic, the McAfee Web Gateway scans user-generated content on all key web protocols, including HTTP, HTTPS, and FTP. As part of a fully-integrated McAfee data loss prevention solution, the McAfee Web Gateway protects against loss of confidential information and other threats leaking from the organization through blogs, wikis, and online productivity tools such as organizers and calendars.

The McAfee Web Gateway WG5000 and WG5500 Appliances also provide administrators with the ability to monitor and troubleshoot the appliance.

The McAfee Web Gateway combines and integrates numerous protections that would otherwise require multiple stand-alone products. Web filtering, anti-virus, anti-spyware, SSL scanning, and content control filtering capabilities are combined into a single appliance. A simplified management footprint means that a single security policy can be shared across protections and protocols.

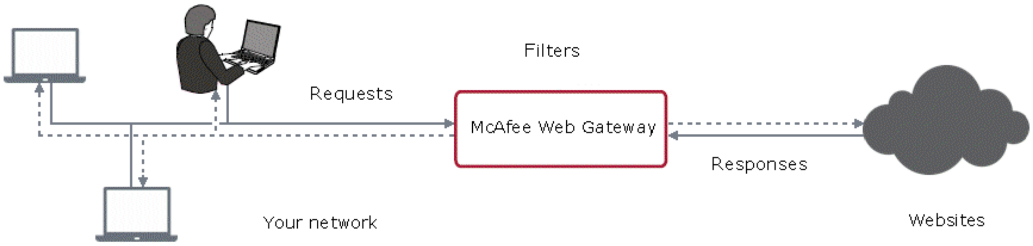


Figure 2 – Typical Deployment Scenario

[5] HTML – Hypertext Markup Language
[6] NTLM – Microsoft Windows NT LAN Manager
[7] LDAP – Lightweight Directory Access Protocol
[8] RADIUS – Remote Authentication Dial-up User Service
[9] SNMP – Simple Network Management Protocol
[10] SSL – Secure Sockets Layer

.

Table 1 below provides general specification for the McAfee Web Gateway WG5000 and WG5500 Appliances.

Table 1 – McAfee Web Gateway Model Specifications

	WG5000	WG5500
Form Factor	1U rack-mount	2U rack-mount
Processor	quad core	2 quad core
Memory	6 GB	12 GB
Interfaces	4 x 10/100/1000	4 x 10/100/1000
RAID	RAID[11] 0/1/10	RAID 0/1/10
Hard Disk	Available: 6 x 300 GB SAS Installed : 2 x 300 GB SAS	Available: 8 x 300 GB SAS Installed : 6 x 300 GB SAS
Power Supply	Redundant	Redundant
CPU	Intel Xeon E5640	Intel Xeon E5660

The McAfee Web Gateway WG5000 and WG5500 Appliances are validated at the FIPS 140-2 Section levels shown in Table 2 below.

Table 2 – Security Level Per FIPS 140-2 Section

Section	Section Title	Level
1	Cryptographic Module Specification	3
2	Cryptographic Module Ports and Interfaces	2
3	Roles, Services, and Authentication	2
4	Finite State Model	2
5	Physical Security	2
6	Operational Environment	N/A
7	Cryptographic Key Management	2
8	EMI/EMC[12]	2
9	Self-tests	2
10	Design Assurance	3
11	Mitigation of Other Attacks	N/A

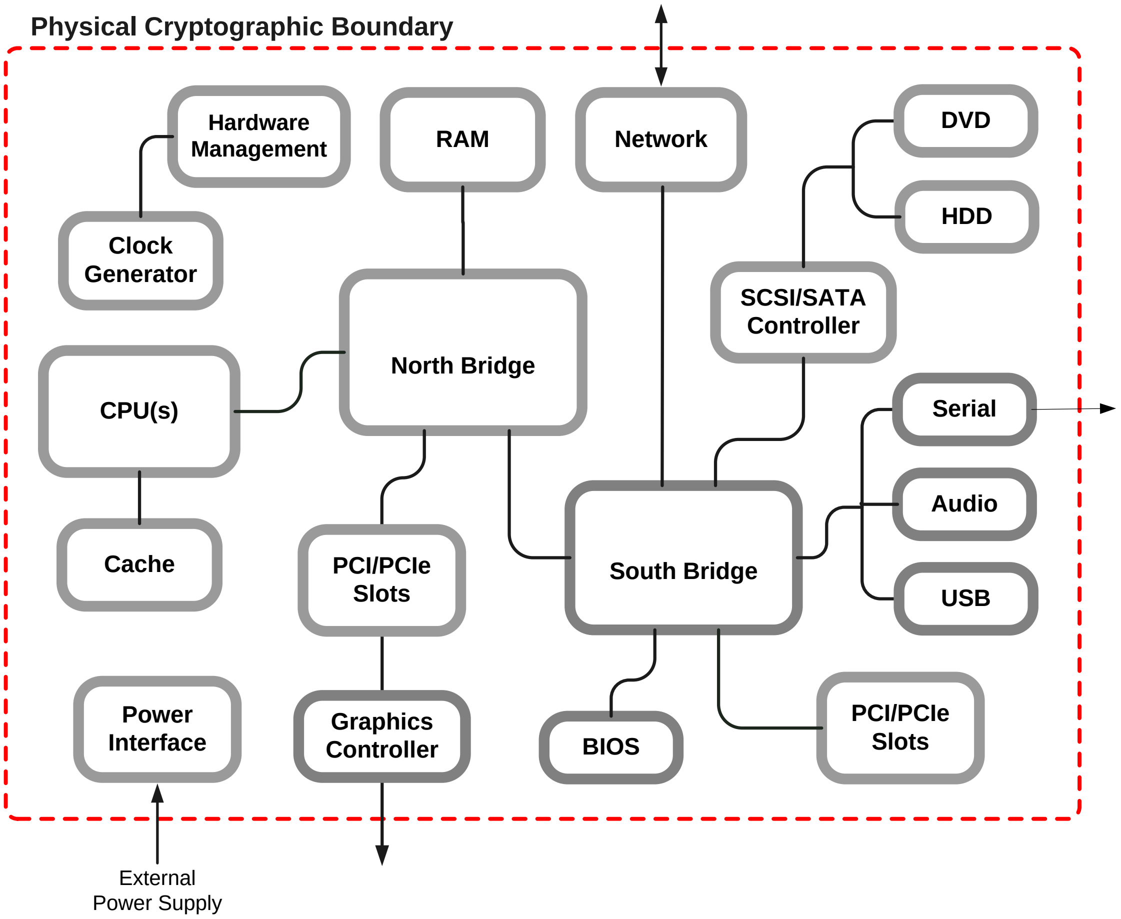
2.2 Module Specification

The McAfee Web Gateway is a multi-chip standalone cryptographic hardware module that meets overall Level 2 FIPS 140-2 requirements. The cryptographic boundary of the module is defined by the hard metal

[11] RAID – Redundant Array of Inexpensive Disks

[12] EMI/EMC – Electromagnetic Interference / Electromagnetic Compatibility

chassis, which surrounds all the hardware and firmware components. Figure 3 [13]depicts the block diagram and the cryptographic boundary of the module, which is indicated using the red dotted line. Please note that the anti-virus and URL categorization modules are excluded from the cryptographic boundary.



KEY:

BIOS – Basic Input/Output System	PCIe – PCI express
CPU – Central Processing Unit	HDD – Hard Disk Drive
SATA – Serial Advanced Technology Attachment	DVD – Digital Video Disc
SCSI – Small Computer System Interface	USB – Universal Serial Bus
PCI – Peripheral Component Interconnect	RAM – Random Access Memory

Figure 3 – Block Diagram for the WG 5000 and WG 5500

[13] It should be noted that either the serial port or the VGA port is used for status output but not both at the same time.

2.3 Module Interfaces

The McAfee Web Gateway is a multi-chip standalone cryptographic module that meets overall Level 2 FIPS 140-2 requirements. Interfaces on the module can be categorized as the following FIPS 140-2 logical interfaces:

- Data Input Interface
- Data Output Interface
- Control Input interface
- Status Output Interface
- Power Interface

All ports and interfaces are located at the front or back side of the hardware module. The front of the chassis is populated with the power/sleep, reset, ID[14], and NMI[15] buttons and several LEDs[16]; please note that some of these are covered by the bezel. The front and rear view of the appliances are shown in the figures below.

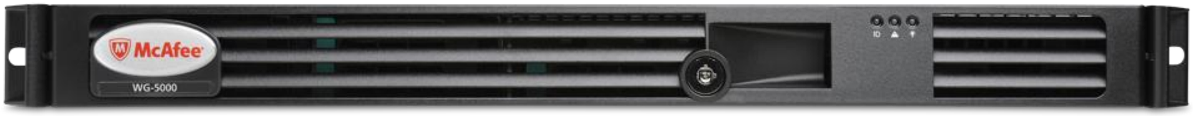


Figure 4 – McAfee Web Gateway 5000 (Front View)

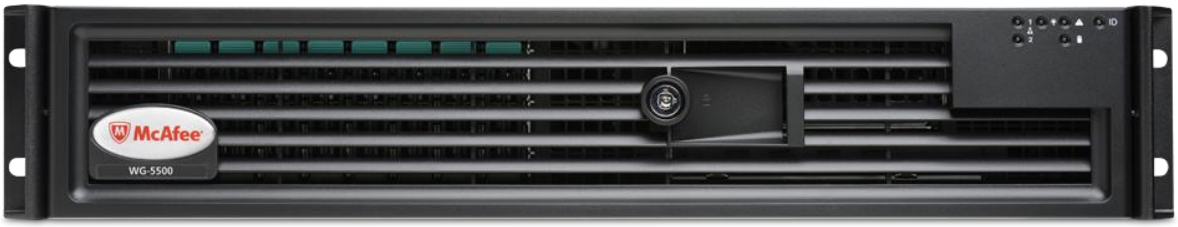


Figure 5 – McAfee Web Gateway 5500 (Front View)

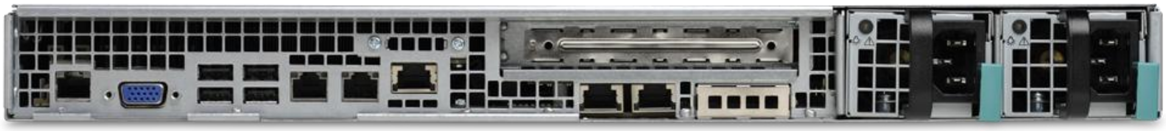


Figure 6 – McAfee Web Gateway 5000 (Rear View)

[14] ID – Identification

[15] NMI – Non- Maskable Interrupt

[16] LED – Light-Emitting Diode

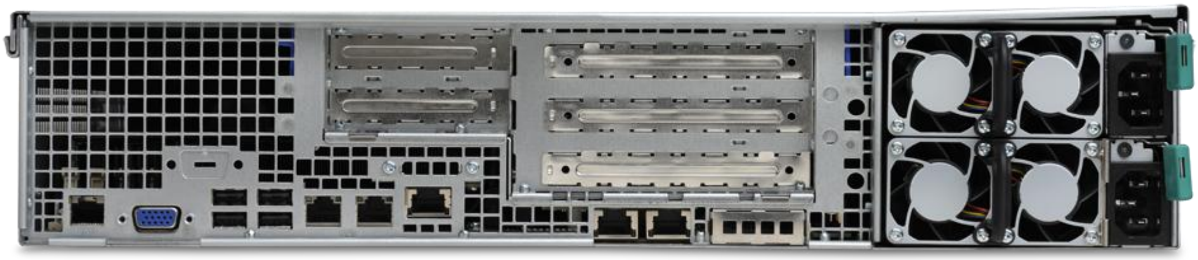


Figure 7 – McAfee Web Gateway WG5000 (Rear View)

Table 3 below provides a description of the LEDs visible on the WG5000 and WG5500 appliances with the bezels attached.

Table 3 – LED Descriptions

Model	LED	Color	Condition	Description
WG5000/ WG5500	Power/Sleep	Green	On	System on
			Blink[17,18]	Sleep
		Off	Off	System off
	NIC[19]1/NIC2 (WG5500 only)	Green	On	NIC link
			Blink	NIC activity
	System Status (on standby power)	Green	On	Running/ Normal Operation
			Blink [17,20]	Degraded
		Amber	On	Critical or non-recoverable condition
			Blink[17,]	Non-critical condition
		Off	Off	POST[21]/System Stop
	Disk Activity (WG5500 only)	Green	Random blink	Provides an indicator for disk activity
		Off	Off[22]	No hard disk activity

[17] Blink rate is ~1Hz at 50% duty cycle

[18] The power LED sleep indication is maintained on standby by the chipset. If the system is powered down without going through the BIOS, the LED state that is in effect at the time of power-off is restored when the system is powered on until the BIOS clears it. If the system is not powered down normally, it is possible that the power LED is blinking while the system status LED is off. This is due to a failure or configuration change that prevents the BIOS from running.

[19] NIC – Network Interface Card

[20] The amber status takes precedence over the green status. When the amber LED is on or blinking, the green LED is off.

[21] POST – Power-On Self-Test

[22] Off when the system is powered off or in a sleep state

Model	LED	Color	Condition	Description
	System Identification	Blue	On	Identify active via command or button
		Off	Off	No identification

Table 4 below describes the ports and interfaces found on the two models of the cryptographic module.

Table 4 – McAfee Web Gateway Ports and Interfaces

Model	Physical Ports
Web Gateway WG5000	• DVD-ROM Drive (covered by bezel) • Four (4) gigabit Ethernet ports • Four (4) Universal Serial Bus (USB) ports • One (1) serial port • One (1) Video Graphics Array (VGA) port • LEDs – ID, System Status, Power • Power/Sleep button, Reset button, ID button, NMI button (covered by bezel) • Two (2) power connectors
Web Gateway WG5500	• DVD-ROM Drive (covered by bezel) • Four (4) gigabit Ethernet ports • Four (4) Universal Serial Bus (USB) ports • Two (2) serial ports (one covered by bezel) • One (1) Video Graphics Array (VGA) port • LEDs – NIC 1, Power, System Status, ID, NIC 2, Hard Disk • Power/Sleep button, Reset button, ID button, NMI button (covered by bezel) • Two (2) power connectors

Once the module has been mounted and applied with the tamper-evident seals by the Crypto-Officer, all physical ports marked with "(covered by bezel)" will not be accessible unless the seals are broken by the Crypto-Officer. The Crypto-Officer role is defined in Section 2.4.1.

The module's ports and interfaces are mapped to logical interfaces in Table 5 below. All of these physical interfaces are separated into logical interfaces defined by FIPS 140-2, as described in Table 5.

Table 5 – FIPS 140-2 Logical Interface Mappings

FIPS 140-2 Interface	McAfee Web Gateway WG5000 and WG5500 Appliances Physical Ports
Data Input	Ethernet ports
Data Output	Ethernet ports
Control Input	Ethernet ports
Status Output	Ethernet ports, serial port or VGA port, LEDs

.

FIPS 140-2 Interface	McAfee Web Gateway WG5000 and WG5500 Appliances Physical Ports
Power	Power connectors

Status output will be provided via the serial port or the VGA port, dependant on the option selected during installation of the V7.1.0 firmware.

2.4 Roles and Services

The module supports role-based authentication. There are two authorized roles in the module that an operator may assume: a Crypto-Officer (CO) role and a User role.

2.4.1 Crypto-Officer Role

The Crypto-Officer (CO) role performs administrative services on the module, such as initialization, configuration, and monitoring of the module. Before accessing the module for any administrative service, the operator must authenticate to the module. The module offers the following management interfaces:

- MWGUI[23]
- SNMPv3

2.4.2 User Role

A User of the module is any one of a set of clustered modules that share configuration information of the master McAfee Web Gateway appliance. Users have to authenticate to the module with a valid certificate before they can access any of the user services.

2.4.3 Services

Services provided to authenticated operators are provided in Table 6 below. Please note that the keys and Critical Security Parameters (CSPs) listed indicate the type of access required:

- Read (R) : The CSP is read
- Write (W): The CSP is established, generated, modified, or zeroized
- Execute (X): The CSP is used within an Approved or Allowed security function or authentication mechanism

Table 6 – Authenticated Services

Service	Description	Operator		Type of Access
		CO	User	
Perform initial configuration	Configure the primary network interface, IP[24] address, host name, and DNS[25] server	X		None

[23] MWGUI – McAfee Web Gateway Graphical User Interface
[24] IP – Internet Protocol
[25] DNS – Domain Name System

.

Service	Description	Operator		Type of Access
		CO	User	

Configure FIPS mode	Configures the module in FIPS mode	X		Crypto Officer (CO) password – RWX;
				ANSI[26] X9.31 PRNG[27] seed – RWX;
				ANSI X9.31 PRNG key – RX;
				DH[28] Establishment Key – RX;
				RSA[29] Establishment Key – RX;
				TLS[30] Session Key – RWX;
				UI[31] certificate and key – RWX;
				Cluster CA[32] public key – W;
				Cluster server certificate and key – W;
				Cluster client certificate and key – W

CO Login	Crypto Officer login	X		ANSI X9.31 PRNG seed – RWX;
				ANSI X9.31 PRNG key – RX;
				DH Establishment Key – RX;
				RSA Establishment Key – RX;
				TLS Session Key – RWX;
				UI certificate and key – RX;
				CO password – R or
				RADIUS shared secret – R or
				LDAP – R or
				NTLM – R

Implement/modify a web security policy*	Create/modify web security policy using rules and filter lists	X		Root CAs and keys – RW;
				Root CAs (public keys) – RW;
				RADIUS shared secret – W;
				LDAP account password – W;
				NTLM machine account password – W

[26] ANSI – American National Standards Institute
[27] PRNG – Pseudo Random Number Generator
[28] DH – Diffie Hellman
[29] RSA – Rivest, Shamir, and Adleman
[30] TLS – Transport Layer Security
[31] UI – User Interface
[32] CA – Certificate Authority

Service	Description	Operator		Type of Access
		CO	User	
Import a license*	Import a license	X		None

Modify configuration settings*	Modify appliance configuration settings	X		UI certificate and key – W;
				Cluster CA public key – W;
				Cluster server certificate and key – W;
				Cluster client certificate and key – W;
				WCCP[33] authentication key – W;
				SNMP v3 passwords – W;
				NTLM machine account password – W

Manage administrator account*	Set up account for administrator	X		CO password – W;
				RADIUS shared secret – W;
				NTLM machine account password – W;
				NTLM machine account password – W

Backup appliance configuration*	Store the appliance's configuration information (including rules, lists, settings, and administrator accounts) in a backup file	X		CO Password; SNMP v3 Password; RADIUS shared secret; LDAP account password; UI Certificate and Key; Root CAs and keys; Root CAs (public keys); WCCP key – R
Restore appliance configuration*	Restore the appliance's configuration information from a backup file	X		CO Password, SNMP v3 Password, RADIUS shared secret, LDAP account password, UI Certificate and Key, Root CAs and keys, Root CAs (public keys), WCCP key – W
Monitor system functions*	Monitor how the appliance executes its filtering functions	X		None
Monitor status on SNMP	Monitors non security relevant status of the module via SNMPv3	X		SNMP v3 Password -Read
Perform self-tests*	Run self-tests on demand (via UI)	X		None
Perform self-tests	Run self-tests on demand (via power cycle)	X		None

[33] WCCP – Web Cache Communication Protocol

.

Service	Description	Operator		Type of Access
		CO	User	
Show status*	Allows Crypto-Officer to check whether FIPS mode is enabled	X		None
Zeroize	Zeroizes the module to the factory default state	X		All Keys and CSPs – Erase
Configure cluster CA*	Services required to communicate with each other in multi-appliance configurations	X		Cluster CA public key – W; Cluster server certificate and key – W; Cluster client certificate and key – W
Note: The '*' above indicates the 'CO Login' service is required.				

Configuration sharing	Clustered instances share the configuration information of the McAfee Web Gateway master		X	ANSI X9.31 PRNG seed – RWX;
				ANSI X9.31 PRNG key – RX;
				DH Establishment Keys – RWX;
				Cluster CA public key – RX;
				Cluster server certificate and key – RX;
				Cluster client certificate and key – RX;
				TLS session keys – WX;
				CO Password, SNMP v3 Password, RADIUS shared secret, LDAP account password, UI Certificate and Key, Root CAs and keys, Root CAs (public keys), WCCP – W or R (depending on originator)

In addition to the services listed above, the module also offers a service that allows the CO to replace a power supply as per instructions provided in Section 3.1.3.

2.4.4 Unauthenticated Operator Services

The module offers one service for unauthenticated operators or the end-users of the appliance. Its function is to provide traffic filtering functionalities for all requests made to the web and responses coming from the web. See Table 7 for that service.

Table 7 – Unauthenticated Operator Service

Service	Description	CSP and Type of Access
Traffic filtering	Utilize traffic filtering functionality via Ethernet ports	None

2.4.5 Authentication Mechanisms

Crypto-Officers may authenticate to the module using one of the following configurable methods:

.

- NTLM
- NTLM-Agent
- LDAP
- RADIUS

The module employs the following authentication methods to authenticate module operators.

Table 8 – Authentication Mechanisms Employed by the Module

Role	Type of Authentication	Authentication Strength
Crypto-Officer	Password	Passwords are required to be at least 8 characters long. The password requirement is enforced by the Security Policy. The maximum password length is 64 characters. The password must contain the following: • At least one lower case letter. • At least one upper case letter. • At least one numeric or special character. Alphabetic (upper and lower cases), numeric and/or special characters can be used with repetition, which gives a total of 62 characters to choose from. The chance of a random attempt falsely succeeding is 1:62^8, or 1:218,340,105,584,896.
User	RSA Public Key Certificate	The module supports RSA digital certificate authentication during TLS sessions. Using conservative estimates and equating a 1024-bit RSA key to an 80-bit symmetric key, the probability for a random attempt to succeed is 1:2^{80}.

2.5 Physical Security

The McAfee Web Gateway is a multi-chip standalone cryptographic module. The module is contained in a hard metal chassis, which is defined as the cryptographic boundary of the module. The module's chassis is opaque within the visible spectrum. The enclosure of the module has been designed to satisfy Level 2 physical security requirements. There are only a limited set of vent holes provided in the cases, and internal foam baffles obscure the view of the internal components of the module. Tamper-evident labels are applied to the case and must be inspected periodically to provide physical evidence of attempts to remove the case. The placement of tamper-evident labels can be found in the Secure Operation section of this document.

2.6 Operational Environment

The operational environment requirements do not apply to the McAfee Web Gateway, because the module does not provide a general-purpose operating system (OS) to the user. The OS has a limited operational environment and only the module's custom written image can be run on the system.

2.7 Cryptographic Key Management

The module's cryptographic functionality is provided by a firmware library that offers secure networking protocols and cryptographic functionalities. Security functions offered by the module in FIPS mode of operation map to the certificates listed in Table 9[34].

Table 9 – Algorithm Certificate Numbers for Cryptographic Libraries

Approved Security Function	Certificate Number
Symmetric Key Algorithm	
AES[35]: 128-, 192-, 256-bit in CBC[36] mode	#1625, #1633
Triple-DES[37] : 168-bit in CBC mode	#1065, #1069
Secure Hashing Algorithm (SHA)	
SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512	#1434, #1438
Message Authentication Code (MAC) Function	
HMAC[38] using SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512	#956, #960
Pseudo Random Number Generator (PRNG)	
ANSI X9.31 Appendix A.2.4 PRNG with 128 AES	#872, #875
Asymmetric Key Algorithm	
RSA PKCS[39] #1 sign/verify: 1024-bit	#803, #807
Digital Signature Algorithm (DSA) verify: 1024-bit	#511, #514

The module also implements the following non-Approved algorithms allowed to be used in FIPS mode.

- Message Digest 4 (MD4) (NTLM only)
- MD5 (TLS and WCCP)
- Rivest Cipher 4 (RC4) (NTLM only)
- DES (NTLM only)
- Non approved RNG (seeding)
- Diffie-Hellman: 1024-bit keys (key agreement; key establishment methodology provides 80 bits of encryption strength)
- RSA key wrapping: 1024-bit keys (key wrapping; key establishment methodology provides 80 bits of encryption strength)

The module supports the CSPs listed below in Table 10.

[34] As of January 2011 the following algorithms are restricted or deprecated: 1024-bit RSA 1024-bit DSA, ANSI X9.31 RNG, SHA-1, Diffie-Hellman. Please refer to NIST Special Publication 800-131A for more information.

[35] AES – Advanced Encryption Standard

[36] CBC – Cipher-Block Chaining

[37] DES – Data Encryption Standard

[38] HMAC – (Keyed-) Hash Message Authentication Code

[39] PKCS – Public Key Cryptography Standard

.

Table 10 – List of Cryptographic Keys, Cryptographic Key Components, and CSPs

Key/CSP	Key/CSP Type	Generation / Input	Output	Storage	Zeroization	Use
Crypto-Officer Password	Password	Set via UI[40] or imported	Configuration sharing or backup - encrypted	Stored as SHA256 hash in the configuration on hard disk	Overwritten by another password or when appliance is re-imaged	Authentication of administrators (Crypto-Officers)
SNMP v3 password	Password	Set via UI or imported	Configuration sharing or backup - encrypted	Stored as USM[41] hash (rfc3414) in the configuration on hard disk	Overwritten by another password or when appliance is re-imaged	Used with SHA1 and AES for authentication of SNMP requests
RADIUS shared secret	Password	Set via UI or imported	Configuration sharing or backup - encrypted	Stored in plain text in the configuration on hard disk	Overwritten by another password or when appliance is re-imaged	Authenticate RADIUS messages
NTLM machine account password	Password	Internally generated by FIPS approved RNG	Never leaves the module	Stored on hard disk in plain text	Overwritten by another password or when appliance is re-imaged	Authenticate at Domain
LDAP account password	Password	Set via UI or imported	Configuration sharing or backup - encrypted	Stored on hard disk in plain text in the configuration	Overwritten by another password or when appliance is re-imaged	Authenticate at LDAP
Cluster CA public key	X509 / RSA >= 2048 bits	Preinstalled and later changed via UI	Never leaves the module	Stored on hard disk in plain text	Overwritten via UI or when appliance is re-imaged	Verification of other cluster member and issuing of a cluster client certificate

[40] UI – User Interface

[41] USM – User-based Security Model

.

Key/CSP	Key/CSP Type	Generation / Input	Output	Storage	Zeroization	Use
Cluster server certificate and key	X509 / RSA with 1024 bits	Internally generated by FIPS approved RNG	Private key will not leave the module	Stored on hard disk in plain text or in encrypted form (PKCS#8) with password derived from UUID[42]	Appliance re-image or reissuing due to Cluster CA change	Client / Server authentication for Transport Layer Security cluster communication
Cluster client certificate and key	X509 / RSA with 1024 bits	Internally generated by FIPS approved RNG	Private key will not leave the module	Stored on hard disk in plain text or in encrypted from (PKCS8) with password derived from UUID	Appliance re-image or reissuing due to Cluster CA change	Client / Server authentication for TLS cluster communication
UI certificate and key	X509, RSA with >= 1024 bits	Set via UI or imported	Configuration sharing or backup - encrypted	Stored in plain text in the configuration on hard disk	Overwritten via UI or when appliance is re-imaged	Serve TLS connection to the UI
Root CAs and keys	X509, RSA with >= 2048 bits	Set via UI or imported	Configuration sharing or backup - encrypted	Stored in plain text in the configuration file on hard disk	Overwritten via UI or when appliance is re-imaged	SSL-Scanner: Issuing server certificates
Root CAs (public keys)	X509, RSA with >= 1024 bits	Set via UI or imported	Configuration sharing or backup - encrypted	Stored in plain text in the configuration on hard disk	Overwritten via UI or when appliance is re-imaged	SSL-Scanner: Verification of TLS connections
DH Establishment Keys	Diffie-Hellman 1024 bit	Internally generated by FIPS approved RNG	Never leaves the module	Stored in plain text on hard disk	By power cycle or session termination	TLS connections for cluster communication, configuration, signature updates and SSL Scanner functions

[42] UUID – Universally Unique Identifier

.

Key/CSP	Key/CSP Type	Generation / Input	Output	Storage	Zeroization	Use
RSA Establishment Keys	RSA key transport 1024 bit	Internal taken from Certificate	Never leaves the module	Stored in plain text on hard disk	By power cycle or session termination	TLS connections for UI or SSL Scanner
TLS Session key	3DES, AES 128, AES 256	Internally generated by FIPS approved RNG	Never leaves the module	Volatile memory in plain text	By power cycle or session termination	TLS connections for cluster communication, Configuration, signature updates and SSL Scanner functions
ANSI X9.31 PRNG seed	16 bytes of seed value	Internally generated by non-approved RNG	Never leaves the module	Volatile memory in plain text	By power cycle	Generates FIPS approved random number used for openSSL
ANSI X9.31 PRNG key	AES 128 Key	Internally generated by non-approved RNG	Never leaves the module	Volatile memory in plain text	By power cycle	Generates FIPS approved random number used for openSSL
WCCP authentication key	Password	Set via UI or imported	Configuration sharing or backup - encrypted	Stored in plain text in the configuration on hard disk	Overwritten by another password or when appliance is re-imaged	Authentication (MD5) for WCCP UDP[43] control packets

2.8 EMI/EMC

The McAfee Web Gateway system has been tested and found conformant to the EMI/EMC requirements specified by 47 Code of Federal Regulations, Part 15, Subpart B, Unintentional Radiators, Digital Devices, Class A (i.e., for business use).

2.9 Self-Tests

The McAfee Web Gateway performs power-up and conditional self-tests as stated in the sections below.

2.9.1 Power-Up Self-Tests

The McAfee Web Gateway performs the following self-tests at power-up:

- Firmware integrity check using MD5 Error Detection Code (EDC)
- Approved algorithm tests
    - AES Known Answer Test (KAT)

[43] UDP – User Datagram Protocol

.

  - Triple-DES KAT
  - SHA-1 KAT
  - HMAC KAT with SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512
  - RSA KAT for sign/verify and encrypt/decrypt
  - DSA pairwise consistency check
  - ANSI X9.31 Appendix A.2.4 PRNG KAT

If any of the tests listed above fails to perform successfully, the module enters into a critical error state where all cryptographic operations and output of any data is prohibited. Operators can reboot or power-cycle the module, to try to clear the error and resume normal operation. If the error does not clear after a reboot the appliance is unrecoverable.

2.9.2 Conditional Self-Tests

The module performs the following conditional self-tests:

- Continuous PRNG Test (CRNGT)
- RSA pairwise consistency test
- DSA pairwise consistency test

Failure in any of the tests listed above leads the module to a conditional error. Conditional self-tests from the User and CO services can lead to a conditional error, which is more easily recoverable than a critical error. The conditional error can be cleared by rebooting or power-cycling the module. However, if the error fails to clear, the module will go into a conditional error state again.

2.10 Mitigation of Other Attacks

This section is not applicable. The module does not claim to mitigate any attacks beyond the FIPS 140-2 Level 2 requirements for this validation.

3 Secure Operation

The McAfee Web Gateway WG5000 and WG5500 Appliances meet Level 2 requirements for FIPS 140-2. The sections below describe how to place and keep the module in FIPS-Approved mode of operation.

3.1 Initial Setup

The following sections provide the necessary step-by-step instructions necessary to configure the module for FIPS Approved mode of operation. McAfee delivers the module via trusted delivery services (FedEx, Expeditors International, and Airgroup Express). For any questions or issues that arise at any point during the installation and configuration of the appliance, contact the McAfee support team at http://www.mcafee.com/us/support.aspx .

3.1.1 Setting FIPS Environment

In order to setup the appliance in FIPS mode, the following steps will need to be performed by an authorized individual:

1. Obtain version 7.1.0 installation image from McAfee extranet site.
2. Write 7.1.0 image to a USB or CD-ROM media.
3. From this point onwards until the appliance is sealed, the appliance must not be left unattended by the operator.
4. Attach keyboard/monitor or serial console to appliance and boot to BIOS. Reset the BIOS setting to their Default settings. Change boot settings to add USB or CD to top of boot order.
5. Reboot with media inserted.
6. Select the FIPS 140-2 level 2 installation mode and serial or keyboard/video as installation operator interface.
7. Wait for disk reformat, install, and reboot.
8. Follow the procedures included in the Installation Guide to complete installation using the installation wizard.
9. Follow the instructions in Section 3.2 to ensure that the appliance is completely configured for FIPS mode of operation. Change the BIOS boot to be hard drive only and add an administrator password to enter the BIOS
10. Install the front bezel and apply tamper-evident labels as per the instructions in Section3.1.2.
11. The appliance is now considered to be operating in a FIPS-Approved mode. Installation in this mode disables logon to the appliance using SSH[44] or from a console and implements other features required for FIPS compliance. System output is displayed on a serial console.

After successful installation, the following needs to be done to maintain compliance:

1. The module should only boot from the hard drive while in FIPS mode.
2. The Intel Remote Management Console on the module is disabled by default and should remain so when the module is being operated in FIPS mode.
3. The log file encryption and/or anonymization feature must be turned off when the module is being operating in FIPS mode

[44] SSH – Secure Shell

3.1.2 Applying Tamper-Evident Labels

The steps mentioned in the sections below should be performed by an authorized individual in order to apply the tamper-evident labels on the appliances.

After receiving the appliance, the CO must apply the tamper-evident labels as described in the steps below. The WG5000 and WG5500 require 5 tamper-evident labels each. Two labels will be placed on the top of the chassis, one across the front bezel and one across the removable top panel. One label will be placed on the bottom of the chassis, across the front bezel. The two power supplies located at the rear of the chassis will require one tamper-evident label each. The labels must be placed on the appliance as indicated by red circles in the figures below. Follow these instructions to securely place the labels to the WG5000 and WG5500 modules:

1. To secure the front bezel, place a tamper-evident label on the top such that it overlaps the front bezel and metal cover at the top of the chassis. (Figure 8 and Figure 11)
2. In order to secure the removable panel on the top of the appliance, apply a tamper-evident label across the ridge. (Figure 9 and Figure 12)
3. Continue to secure the front bezel by placing a tamper-evident label on the bottom such that it overlaps the bottom portion of the bezel and the metal cover at the bottom of the chassis. (Figure 10 and Figure 13)

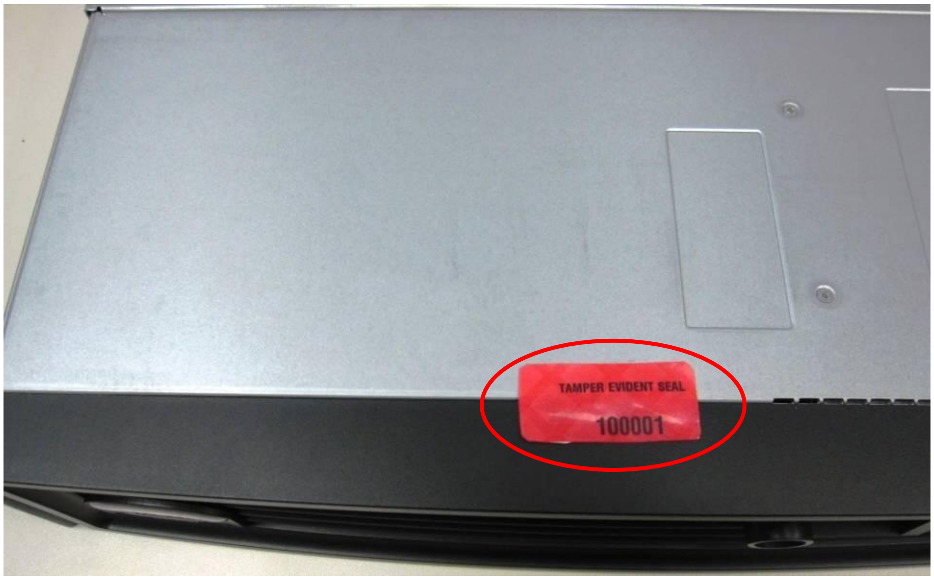


Figure 8 – WG5000 Front Bezel Label Placement (Top)

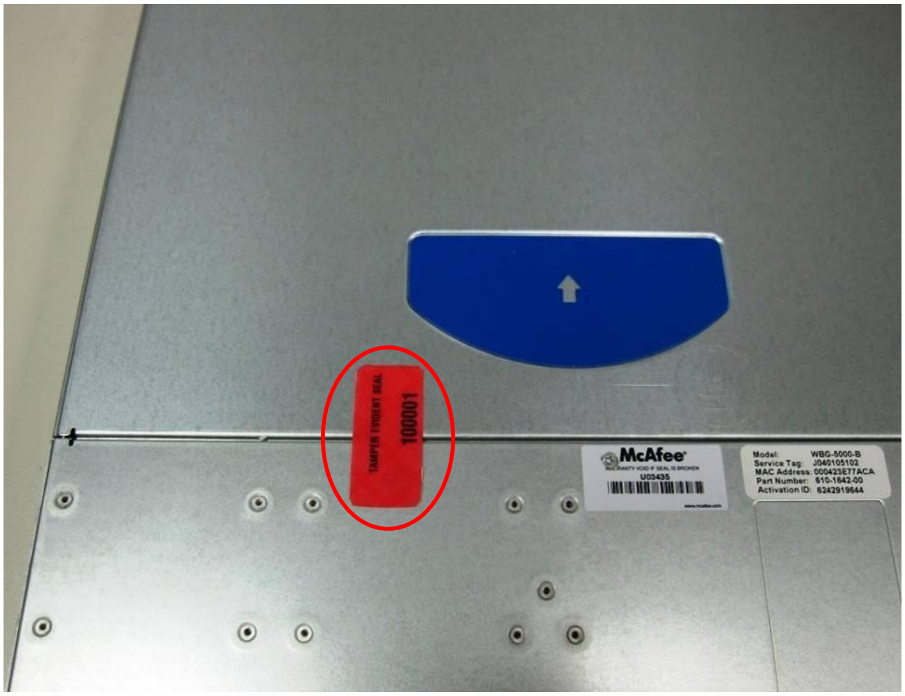


Figure 9 – WG5000 Removable Panel Label Placement

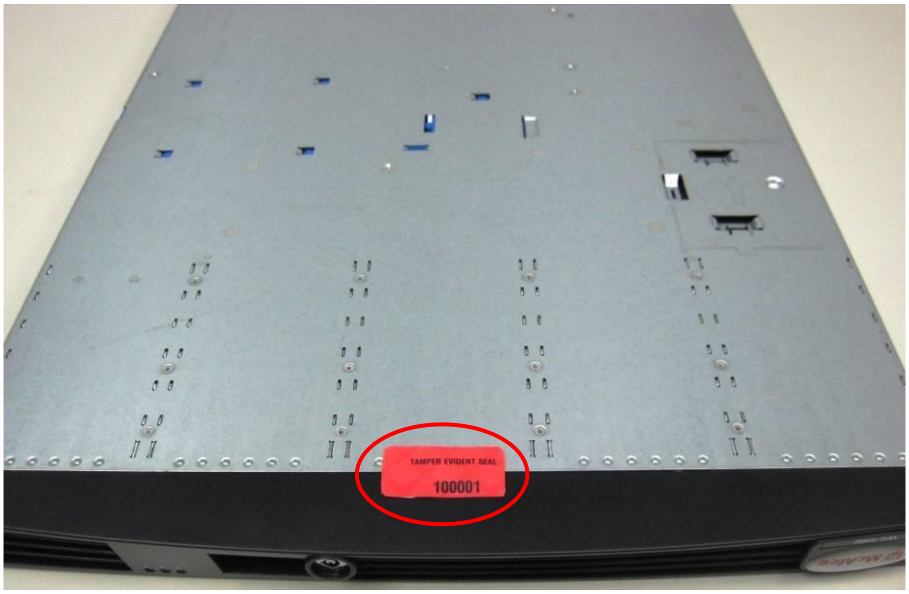


Figure 10 – WG5000 Front Bezel Label Placement (Bottom)

.

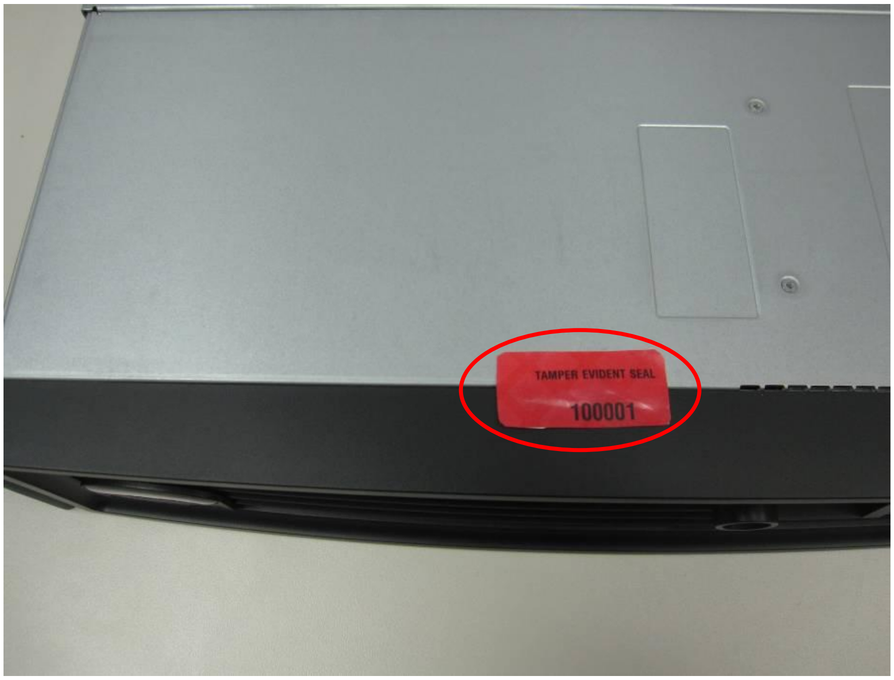


Figure 11 - WG5500 Front Bezel Label Placement (Top)

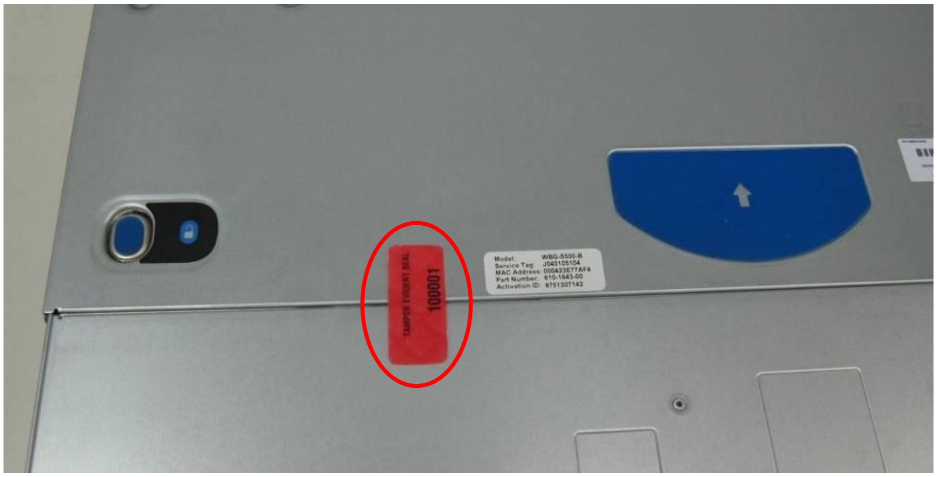


Figure 12 – WG5500 Removable Panel Label Placement

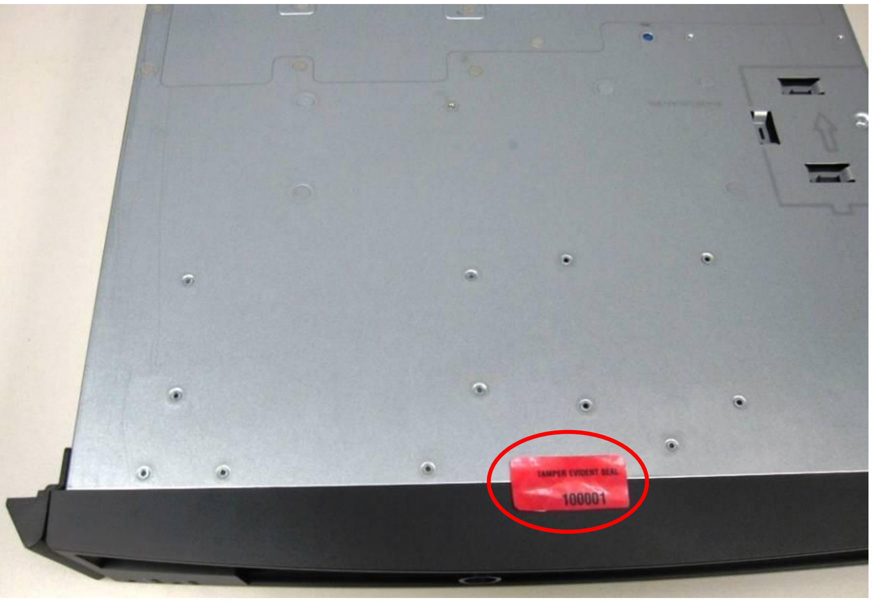


Figure 13 – WG5500 Front Bezel Label Placement (Bottom)

4. To secure the power supplies, place tamper-evident labels on the power supplies such that the labels are affixed to the top of the power supplies and chassis for WG5000 as indicated by the red circles in Figure 14; and to the right side of the power supplies and chassis for WG5500 as indicated by red circles in Figure 15.

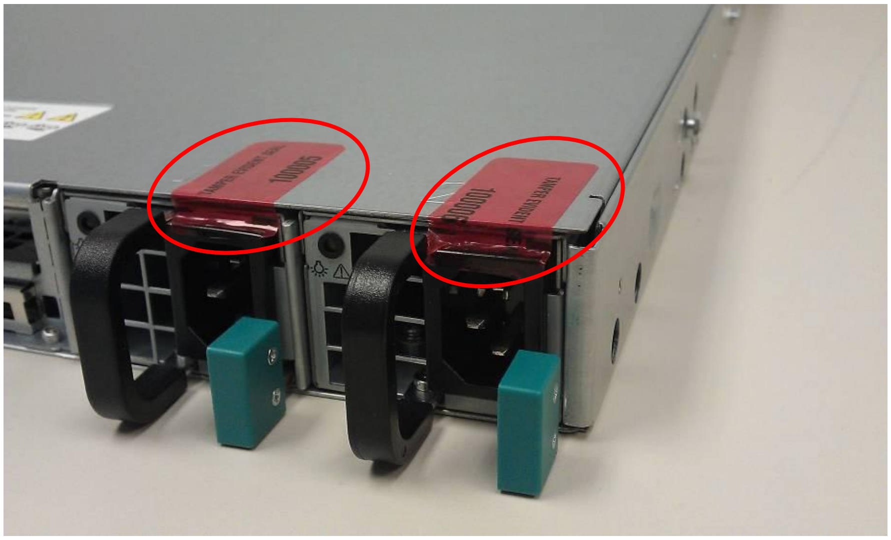


Figure 14 – WG5000 Power Supply Labels Placement

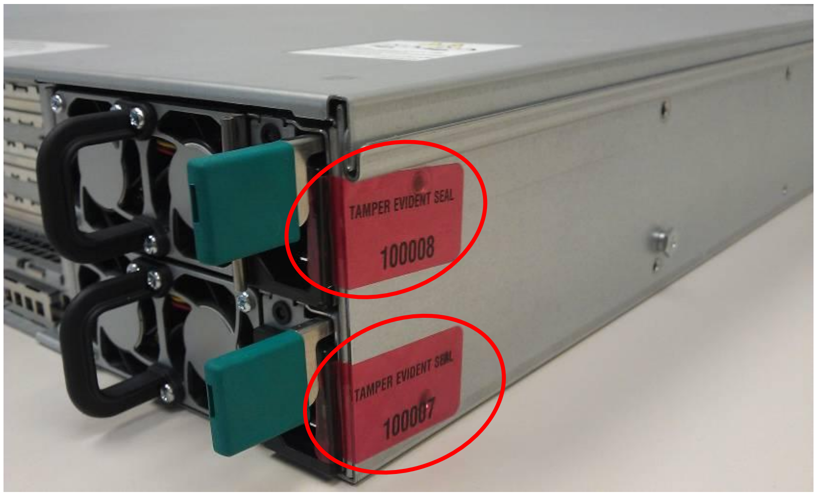


Figure 15 – WG5500 Power Supply Labels Placement

3.1.3 Power Supply Replacement

The module offers a service to the CO for power supply replacement. Only the CO is allowed to break the tamper-evident seal in order to replace a power supply. After the power supply has been successfully replaced, the CO is required to re-apply the tamper-evident label along the power supply module following the instructions provided in Section 3.1.2.

3.2 Crypto-Officer Guidance

The Crypto-Officer is responsible for initializing, performing security-relevant configuration, and monitoring the module. The Crypto-Officer should set a BIOS password to prevent unauthorized individuals from changing the module's settings. During initial set up, the CO should change the default admin password, UI server certificate, and the cluster CA. Additionally, the CO should ensure that the log file encryption and/or anonymization feature is turned off when the module is being operated in FIPS mode. The CO should ensure proper re-application of tamper-evident labels after a power supply is replaced.

The Crypto-Officer can initiate the execution of self-tests, and can access the module's status reporting capability. Self-tests can be initiated at any time by power cycling the module.

3.2.1 Management

The Crypto-Officer is responsible for maintaining and monitoring the status of the module to ensure that it's running in its FIPS-Approved mode. Please refer to Section 3.1 above for guidance that the Crypto-Officer must follow for the modules to be considered in a FIPS-Approved mode of operation.

For details regarding the management of the modules, please refer to the McAfee Web Gateway Installation Guide.

3.2.2 Zeroization

Session keys are zeroized at the termination of the session, and are also cleared when the module is power-cycled. This process includes the ANSI X9.31PRNG seed and ANSI X9.31 key. All other CSPs may be zeroized when leaving the FIPS mode by reimaging the appliance. The Crypto-Officer must wait until the module has successfully rebooted in order to verify that zeroization has completed.

.

3.3 User Guidance

The User does not have the ability to configure sensitive information on the module.

4 Acronyms

This section describes the acronyms used throughout the document.

Table 11 – Acronyms

Acronym	Definition
AC	Alternating Current
AES	Advanced Encryption Standard
ANSI	American National Standards Institute
CBC	Cipher-Block Chaining
CLI	Command Line Interface
CMVP	Cryptographic Module Validation Program
CO	Crypto-Officer
CRNGT	Continuous Random Number Generator Test
CSEC	Communications Security Establishment Canada
CSP	Critical Security Parameter
DB-9	D-subminiature 9-pin connector
DES	Digital Encryption Standard
DNS	Domain Name System
DSA	Digital Signature Algorithm
ECB	Electronic Codebook
EDC	Error Detection Code
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
FIPS	Federal Information Processing Standard
FTP	File Transfer Protocol
GUI	Graphical User Interface
HMAC	(Keyed-) Hash Message Authentication Code
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
HTTPS	Secure Hypertext Transfer Protocol
ID	Identification
IP	Internet Protocol
KAT	Known Answer Test
LDAP	Lightweight Directory Access Protocol
LED	Light Emitting Diode

.

Acronym	Definition
MD	Message Digest
MWGUI	McAfee Web Gateway Graphical User Interface
NIC	Network Interface Card
NIST	National Institute of Standards and Technology
NTLM	Microsoft Windows NT LAN Manager
NMI	Non-Maskable interrupt
OS	Operating System
PCI	Peripheral Component Interconnect
PCIe	Peripheral Component Interconnect Express
PKCS	Public Key Cryptography Standard
POST	Power-On Self-Test
PRNG	Pseudo Random Number Generator
RADIUS	Remote Authentication Dial-In User Service
RAID	Redundant Array of Inexpensive Disks
RC	Rivest Cipher
RSA	Rivest Shamir and Adleman
SHA	Secure Hash Algorithm
SNMP	Simple Network Management Protocol
SSH	Secure Shell
SSL	Secure Sockets Layer
TLS	Transport Layer Security
UDP	User Datagram Protocol
UI	User Interface
URL	Uniform Resource Locator
USB	Universal Serial Bus
USM	User-based Security Model
UTF	Unicode Transformation Format
UUID	Universally Unique Identifier
VGA	Video Graphics Array
WCCP	Web Cache Communication Protocol

Prepared by:
Corsec Security, Inc.

13135 Lee Jackson Memorial Highway, Suite 220
Fairfax, VA 22033
USA

Phone: +1 (703) 267-6050
Email: info@corsec.com
http://www.corsec.com