NON-PROPRIETARY CRYPTOGRAPHIC MODULE SECURITY POLICY FOR THE

HP 5406 ZL [1], HP 5412 ZL [2], HP 8206 ZL [3] AND HP 8212 ZL [4] SWITCHES WITH THE HP MSM765ZL MOBILITY CONTROLLER

(HARDWARE VERSIONS: SWITCHES: (J8697A [1], J8698A [2], J9447A [3], AND J9091A [4] [B]); MANAGEMENT MODULES: (J8726A [1,2] AND J9092A [3,4] [B]); POWER SUPPLY: (J9306A: ONE [1,3] OR TWO [2,4]); SUPPORT MODULE: (J9095A [3,4] [B]); FABRIC MODULE: (J9093A: TWO [3,4] [B]); BLANK PLATE: (5069-8563: FOUR [1], TEN [2], FIVE [3], OR ELEVEN [4]); OPACITY SHIELD KITS: (J9710A [1], J9711A [2], J9712A [3], AND J9713A [4]); HIGH PERFORMANCE FAN TRAYS: (J9721A [1], J9722A [2], J9723A [3], AND J9724A [4]); WITH (HP GIG-T/SFP+ V2 ZL MOD: J9536A; HP MOBILITY CONTROLLER: J9370A [A] AND TAMPER EVIDENT SEAL KIT: J9709A) [1,2,3,4]; FIRMWARE VERSIONS: 5.6.0 [A] AND K.15.07.0003 [B])

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TABLE OF CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

1 INTRODUCTION

1.1 PURPOSE

This document defines the security policy for the four cryptographic modules:

- HP 5406 zl Switch with the HP MSM765zl Mobility Controller;
- HP 5412 zl Switch with the HP MSM765zl Mobility Controller;
- HP 8206 zl Switch with the HP MSM765zl Mobility Controller; and
- HP 8212 zl Switch with the HP MSM765zl Mobility Controller.

The primary focus of this security policy is the HP MSM765zl Mobility Controller since the switch part of the cryptographic module will not be providing cryptographic services when the cryptographic module is configured to execute in the FIPS approved mode of operation.

Section **2** provides information on the version numbers of the components of each of the four cryptographic modules.

1.2 SCOPE

This document is written in accordance with the requirements of Appendix C of FIPS PUB 140-2, and includes the rules derived from the requirements of FIPS PUB 140-2 and the rules derived from any additional requirements imposed by the vendor.

1.3 INTENDED USE

This document is intended to be used:

a. To provide a specification of the cryptographic security that will allow individuals and organizations to determine whether the cryptographic module, as implemented, satisfies a stated security policy; and

b. To describe to individuals and organizations the capabilities, protection, and access rights provided by the cryptographic module, thereby allowing an assessment of whether the module will adequately serve the individual or organizational security requirements.

1.4 ACRONYMS

AC	Alternating Current
AES	Advanced Encryption Standard
ANSI	American National Standards Institute
AP	Access Point
CA	Certificate Authority
CAVP	Cryptographic Algorithm Validation Program
CBC	Cipher Block Chaining
CFR	Code of Federal Regulations
CLI	Command Line Interface
CMVP	Cryptographic Module Validation Program
CPU	Central Processing Unit
CSEC	Communications Security Establishment Canada
CSP	Critical Security Parameter
DES	Data Encryption Standard
EAP	Extensible Authentication Protocol
EAP-PEAPv0	EAP Protected Extensible Authentication Protocol Version 0
EAP-TLS	EAP Transport Layer Security
EAP-TTLS	EAP Tunneled Transport Layer Security
ECB	Electronic Codebook
ED	Electronic Distribution
EE	Electronic Entry
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ESP	Encapsulating Security Payload
FCC	Federal Communications Commission (US)
FIPS	Federal Information Processing Standard
FIPS PUB 140-2	FIPS Publication 140 Second Revision (2)
Gb	Gigabit
GbE	Gigabit Ethernet
GHz	Gigahertz
GUI	Graphical User Interface
HDD	Hard Disk Drive
HMAC	Keyed-Hashing for Message Authentication Code
HP	Hewlett-Packard
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
HTTPS	Secure Hypertext Transfer Protocol
IKE	Internet Key Exchange
IP	Internet Protocol

IPSec	Internet Protocol Security
IT	Information Technology
LAN	Local Area Network
LED	Light Emitting Diode
L2TP	Layer Two (2) Tunneling Protocol
MD	Manual Distribution or Message Digest
MIB	Management Information Base
MSM	Multiservice Mobility
N	Number of Controllers
NIST	National Institute of Standards and Technology
NOC	Network Operations Center
N/A	Not Applicable
OS	Operating System
PoE	Power over Ethernet
PPTP	Point-to-Point Tunneling Protocol
PRNG	Pseudo-Random Number Generator
RADIUS	Remote Authentication Dial-In User Service
RC4	Rivest Cipher 4
RJ	Registered Jack
RS	Recommended Standard
RSA	Rivest Shamir Adleman asymmetric cryptographic algorithm
SDRAM	Synchronous Dynamic Random Access Memory
SFP	Small Form Factor Pluggable
SHA	Secure Hash Algorithm
SHA1 or SHA-1	Secure Hash Algorithm First Revision (1)
SNMP	Simple Network Management Protocol
SOAP	Simple Object Access Protocol
SP	Special Publication
ssh	Secure Shell
SSH	Secure Shell
SSL	Secure Sockets Layer
TLS	Transport Layer Security
VLAN	Virtual Local Area Network
VPN	Virtual Private Network
VSC	Virtual Service Community
WPA	WiFi Protected Access
X9	Accredited Standards Committee on Financial Services
X.	ANSI Group

2 CRYPTOGRAPHIC MODULE OVERVIEW

The HP 5406 zl Switch and HP 5412 zl Switch are advanced intelligent switches in the HP modular chassis product line. The HP 5406 zl Switch has a 6-slot chassis and includes associated zl modules and bundles. The HP 5412 zl Switch is similar but with a 12-slot chassis. The switches offer excellent investment protection, flexibility, and scalability, as well as ease of deployment, operation, and maintenance. Some of their key properties are:

- Advanced access layer, distribution, and core;
- Integrated Layer 2 to Layer 4 intelligent edge feature set;
- Enterprise-class performance and security;
- HP AllianceONE integrated; and
- Scalable 10/100/1000 and 10-GbE connectivity.

The HP 8206 zl Switch and HP 8212 zl Switch offer the same features as the HP 5400 zl Switches but also provide high availability with high performance. The HP 8206 zl Switch has a 6-slot chassis and the HP 8212 zl Switch has a 12-slot chassis. The switches with their high-availability each provide a mission-critical access layer.

The installed HP MSM765zl Mobility Controller enables strong security for wireless enterprise networking, using embedded IPSec VPN and firewall functionalities. The controller is intended for enterprise office environments of differing scales, from the corporate headquarters to remote branch sites, and therefore has been designed with ease of use in mind, making deployment and remote administration as easy as possible.

A HP MSM765zl Mobility Controller can support up to 200 Access Points. The HP MSM765zl Mobility Controller enables secure mobile access to IT resources within enterprise environments, remote access and site-to-site VPN services using the IPSec, L2TP and PPTP protocols. They securely deliver enterprise networking without bounds, significantly increasing employee productivity in corporate offices, in decentralized/remote workgroups, and in branch locations with broadband access.

One particular configuration of the HP MSM765zl Mobility Controller in each of the four Ethernet switches is validated to FIPS PUB 140-2. These are specified in this section. The four Ethernet switches can support other combinations of line cards with the HP MSM765zl Mobility Controller(s).

The four cryptographic modules covered by this Security Policy are comprised of the following components:

1. HP 5406 zl Switch with the HP MSM765zl Mobility Controller

   - 1 HP 5406 zl Switch, Hardware Version: J8697A and Firmware Version: K.15.07.0003;
   - 1 HP Switch 5400 zl Management Module, Hardware Version: J8726A and Firmware Version: K.15.07.0003;
   - 1 HP MSM765zl Mobility Controller, Hardware Version: J9370A and Firmware Version: 5.6.0;
   - 1 HP Gig-T/SFP+ v2 zl Mod, Hardware Version: J9536A;
   - 4 Blank Plates, all with Hardware Version: 5069-8563;
   - 1 HP 1500 W PoE+ zl Power Supply, Hardware Version: J9306A;
   - 1 HP 5406 zl Opacity Shield Kit, Hardware Version: J9710A;
   - 1 HP 5406 zl High Performance Fan Tray, Hardware Version: J9721A; and
   - 1 Tamper Evident Seal Kit, Hardware Version: J9709A.

2. HP 5412 zl Switch with the HP MSM765zl Mobility Controller

   - 1 HP 5412 zl Switch, Hardware Version: J8698A and Firmware Version: K.15.07.0003;
   - 1 HP Switch 5400 zl Management Module, Hardware Version: J8726A and Firmware Version: K.15.07.0003;
   - 1 HP MSM765zl Mobility Controller, Hardware Version: J9370A and Firmware Version: 5.6.0;
   - 1 HP Gig-T/SFP+ v2 zl Mod, Hardware Version: J9536A;
   - 10 Blank Plates, all with Hardware Version: 5069-8563;
   - 2 HP 1500 W PoE+ zl Power Supplies, both with Hardware Version: J9306A;
   - 1 HP 5412 zl Opacity Shield Kit, Hardware Version: J9711A;
   - 1 HP 5412 zl High Performance Fan Tray, Hardware Version: J9722A; and
   - 1 Tamper Evident Seal Kit, Hardware Version: J9709A.

3. HP 8206 zl Switch with the HP MSM765zl Mobility Controller

   - 1 HP 8206 zl Switch, Hardware Version: J9477A and Firmware Version: K.15.07.0003;
   - 1 HP Switch 8200 zl Management Module, Hardware Version: J9092A and Firmware Version: K.15.07.0003;
   - 1 HP Switch 8200zl System Support Module, Hardware Version: J9095A and Firmware Version: K.15.07.0003;
   - 2 HP Switch 8200 zl Fabric Modules, both with Hardware Version: J9093A and Firmware Version: K.15.07.0003;
   - 1 HP MSM765zl with Mobility Controller, Hardware Version: J9370A and Firmware Version: 5.6.0;
   - 1 HP Gig-T/SFP+ v2 zl Mod, Hardware Version: J9536A;
   - 5 Blank Plates, all with Hardware Version: 5069-8563;
   - 1 HP 1500 W PoE+ zl Power Supply, Hardware Version: J9306A;
   - 1 HP 8206 zl Opacity Shield Kit, Hardware Version: J9712A;
   - 1 HP 8206 zl High Performance Fan Tray, Hardware Version: J9723A; and
   - 1 Tamper Evident Seal Kit, Hardware Version: J9709A.

4. HP 8212 zl Switch with the HP MSM765zl Mobility Controller

   - 1 HP 8212 zl Switch, Hardware Version: J9091A and Firmware Version: K.15.07.0003;
   - 1 HP Switch 8200zl Management Module, Hardware Version: J9092A and Firmware Version: K.15.07.0003;
   - 1 HP Switch 8200zl System Support Module, Hardware Version: J9095A and Firmware Version: K.15.07.0003;
   - 2 HP Switch 8200zl Fabric Modules, both with Hardware Version: J9093A and Firmware Version: K.15.07.0003;
   - 1 HP MSM765zl Mobility Controller, Hardware Version: J9370A and Firmware Version: 5.6.0;
   - 1 HP Gig-T/SFP+ v2 zl Mod, Hardware Version: J9536A;
   - 11 Blank Plates, all with Hardware Version: 5069-8563;
   - 2 HP 1500 W PoE+ zl Power Supplies, both with Hardware Version: J9306A;
   - 1 HP 8212 zl Opacity Shield Kit, Hardware Version: J9713A;
   - 1 HP 8212 zl High Performance Fan Tray, Hardware Version: J9724A; and
   - 1 Tamper Evident Seal Kit, Hardware Version: J9709A.

2.1 FIPS PUB 140-2 TARGETED SECURITY LEVELS

Each of the four cryptographic modules covered in this Security Policy is designed to meet Security Level 2 overall.

Table 1 specifies the security level targeted for each of the sections of FIPS 140-2.

FIPS 140-2 Section	Target Security Level
4.1 Cryptographic Module Specification	2
4.2 Cryptographic Module Ports and Interfaces	2
4.3 Roles, Services, and Authentication	2
4.4 Finite State Model	2
4.5 Physical Security	2
4.6 Operational Environment	Not Applicable
4.7 Cryptographic Key Management	2
4.8 Electromagnetic Interference/Electromagnetic Compatibility (EMI/EMC)	2
4.9 Self-Tests	2
4.10 Design Assurance	2
4.11 Mitigation of Other Attacks	Not Applicable

Table 1 – FIPS 140-2 Section Targeted Security Levels

2.2 PORTS AND INTERFACES

Figures 1 to 4 have photographs showing the fronts of each of each of the four cryptographic modules. The interfaces to the cryptographic modules can be seen in the photographs.

Figure 1 shows the front of the HP 5406 zl Switch with the HP MSM765zl Mobility Controller.

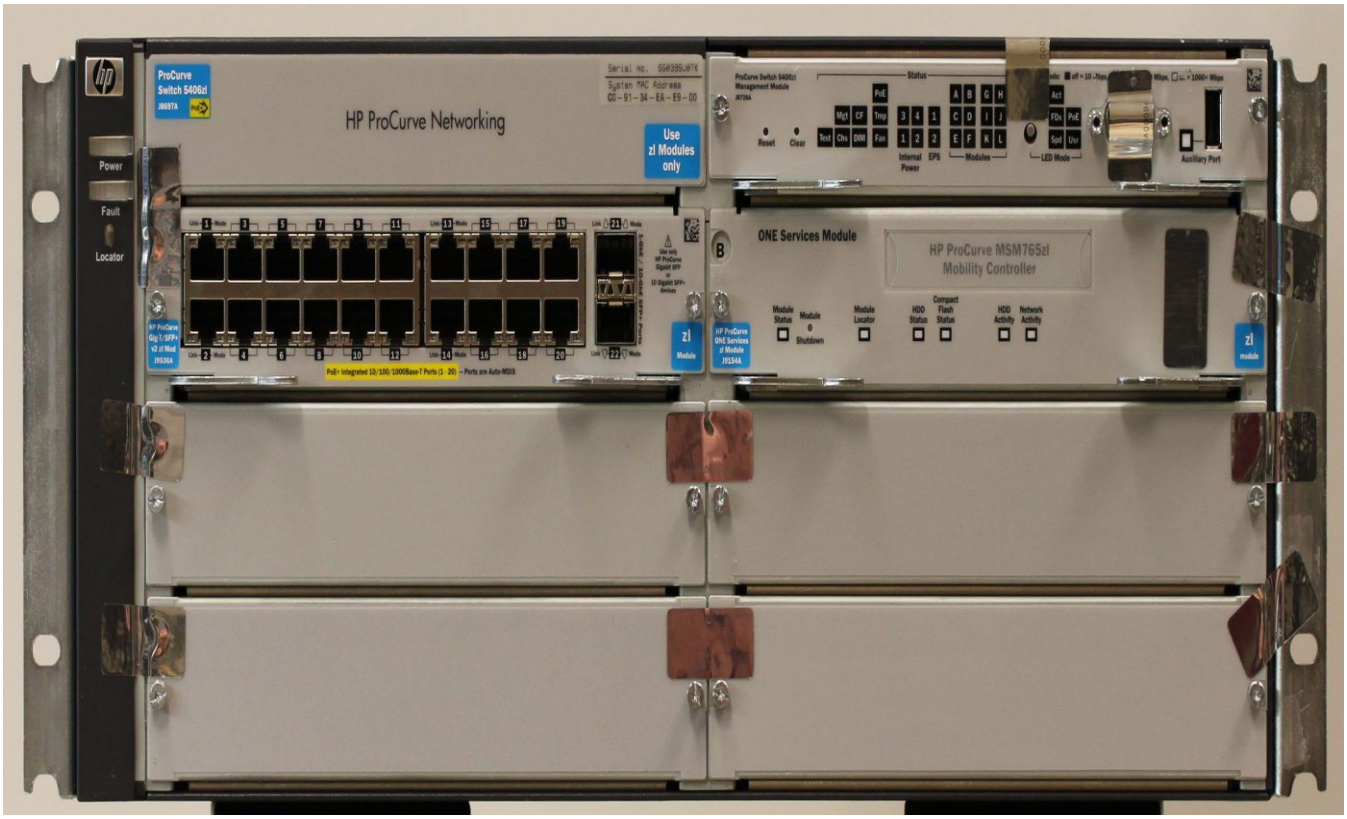


Figure 1 – HP 5406 zl Switch with the HP MSM765zl Mobility Controller

Figure 2 shows the front of the HP 5412 zl Switch with the HP MSM765zl Mobility Controller.

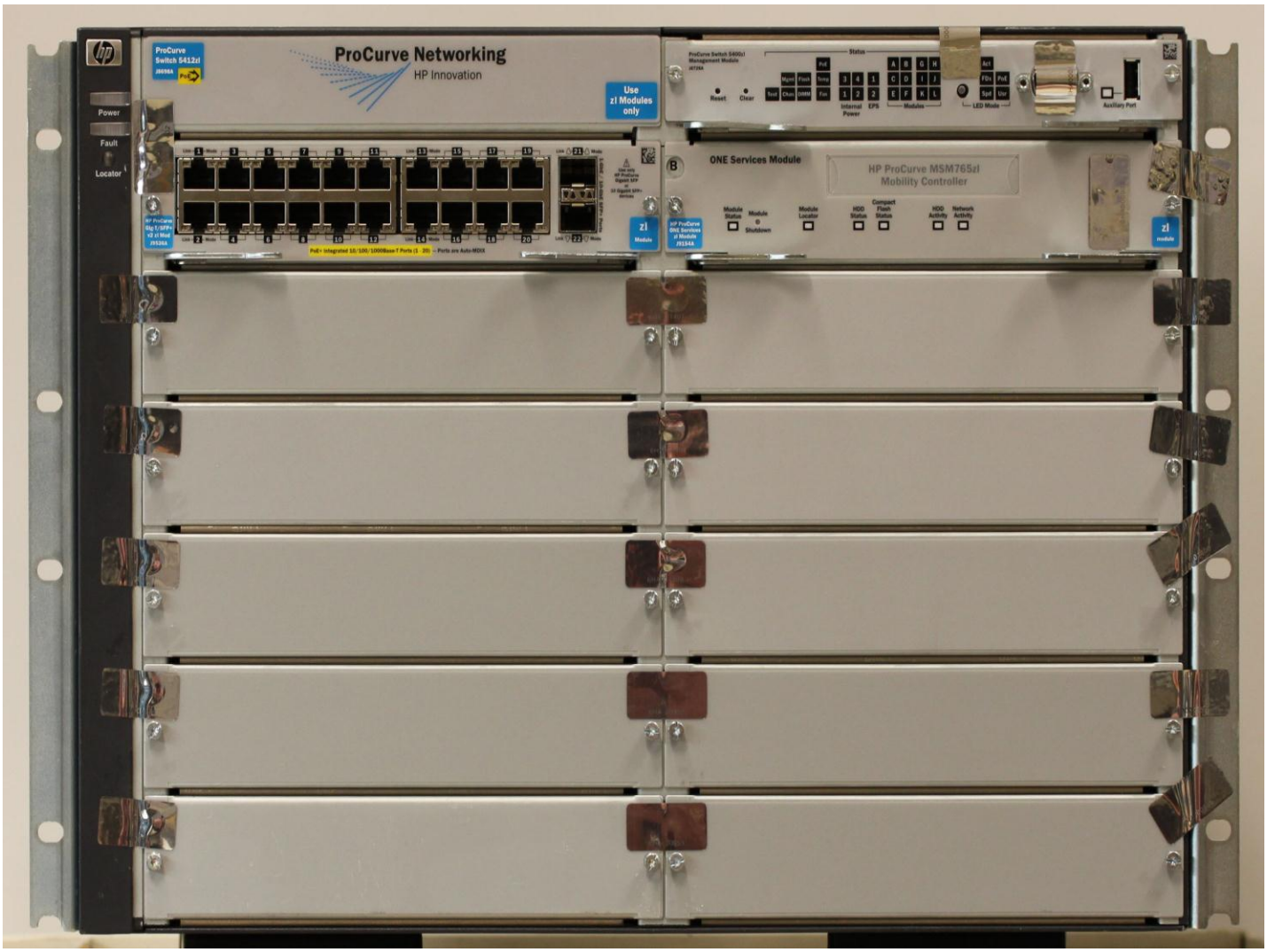


Figure 2 – HP 5412 zl Switch with the HP MSM765zl Mobility Controller

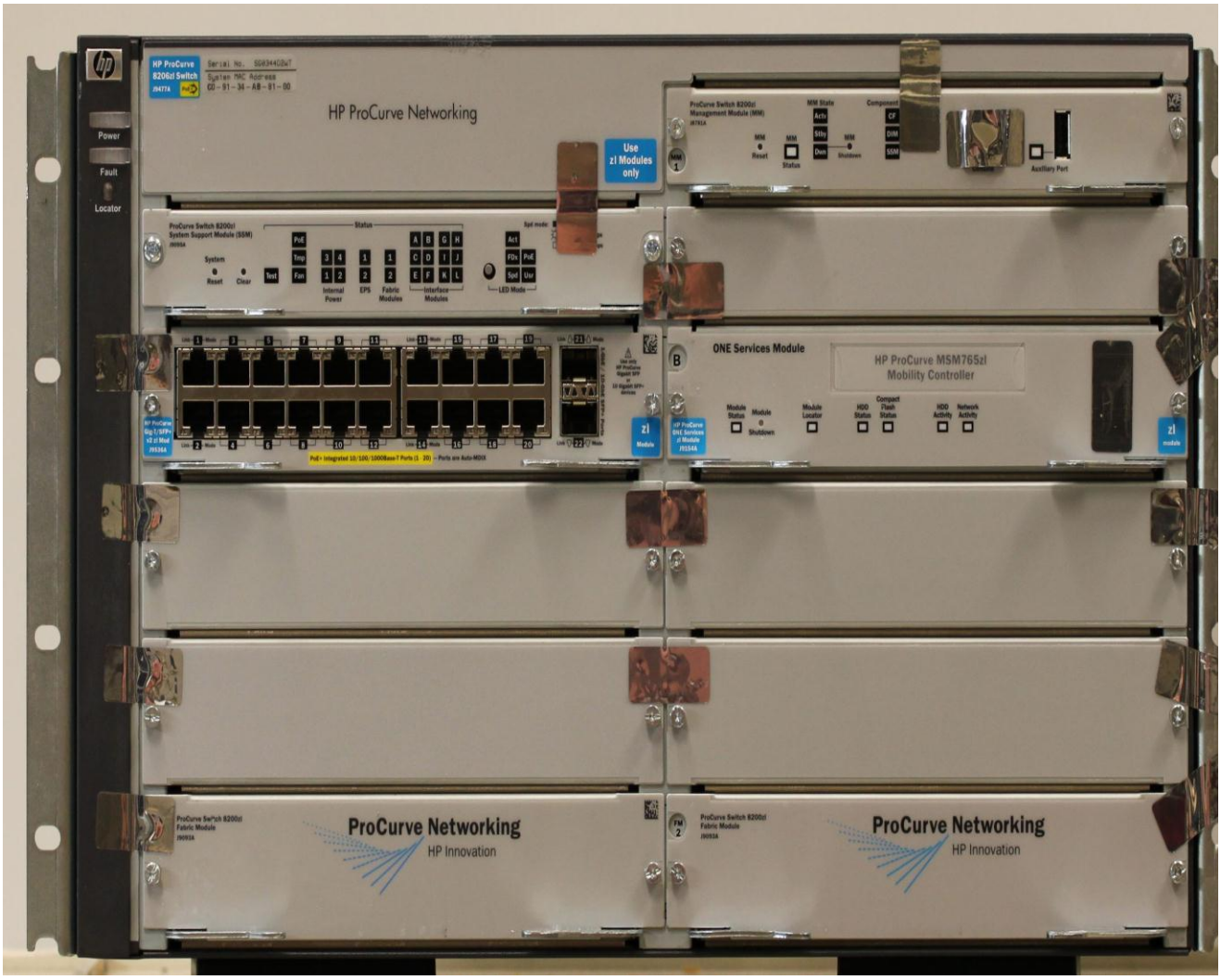


Figure 3 shows the front of the HP 8206 zl Switch with the HP MSM765zl Mobility Controller.

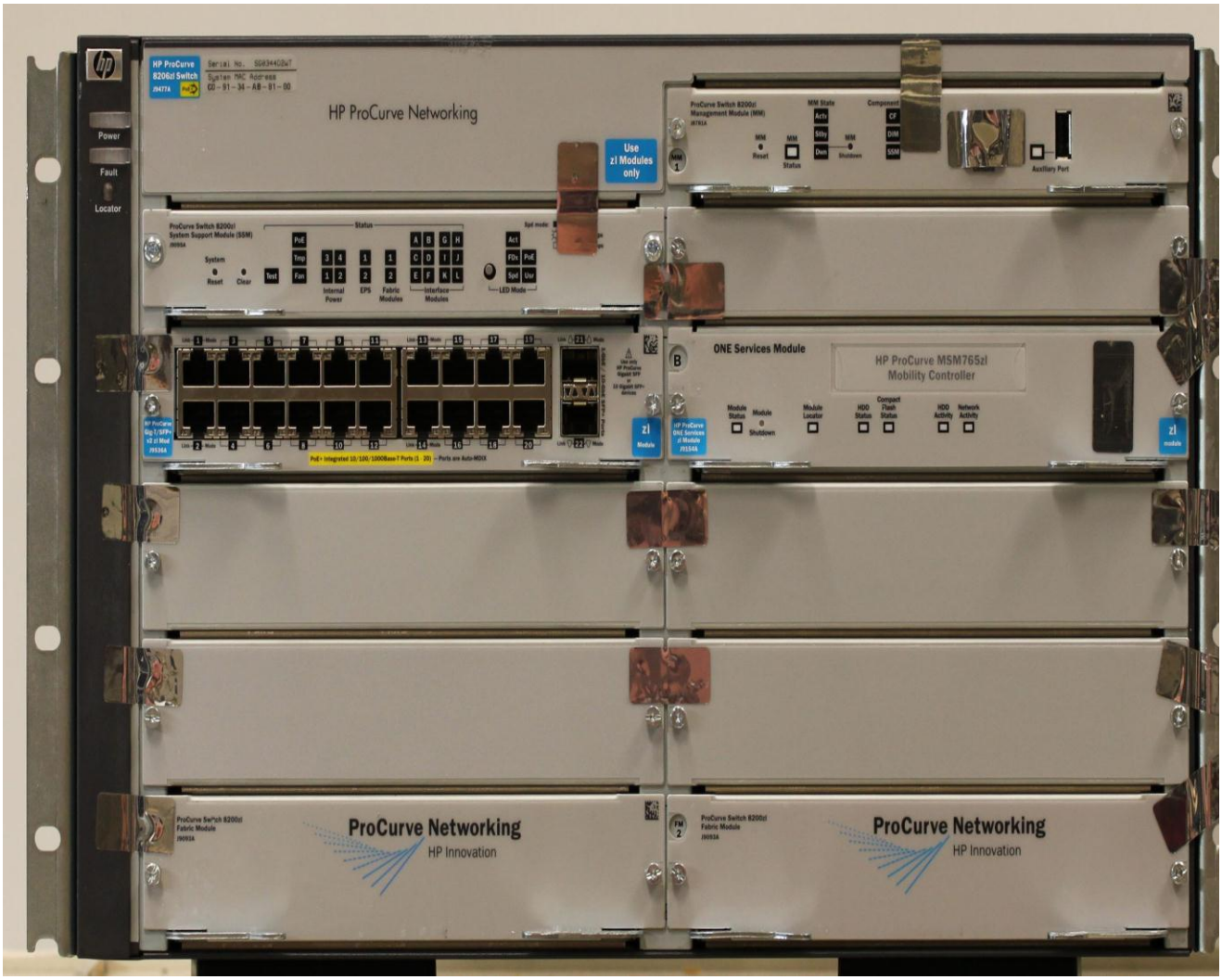


Figure 3 – HP 8206 zl Switch with the HP MSM765zl Mobility Controller

Figure 4 shows the front of the HP 8212 zl Switch with the HP MSM765zl Mobility Controller.

Figure 4 – HP 8212 zl Switch with the HP MSM765zl Mobility Controller

Table 2 lists the interfaces and maps the interfaces specific to the HP MSM765zl Mobility Controller**.** **Table 3** specifies the interfaces for the rest of the HP 5406 zl and HP 5412 zl Switch with the HP MSM765zl Mobility Controller cryptographic modules and **Table 4** specifies the interfaces specific to the rest of the HP 8206 zl and HP 8212 zl Switch with the HP MSM765zl Mobility Controller cryptographic modules.

Interface	Type	Direction	Description	Related Hardware Port
Cryptographic Control	Control Input	To HP MSM765zl Mobility Controller	A web browser interface and CLI allows the Administrator to control the operation of the cryptographic module. The cryptographic module can also be controlled through a console connected to the switch.	Backplane mapped to Ethernet LAN Ports (SFP+ Ports); Backplane mapped to Serial Port
Cryptographic Status	Status Output	From HP MSM765zl Mobility Controller	A web browser interface and/or CLI present the current status of the cryptographic module to the Administrator.	Backplane mapped to Ethernet LAN Ports (SFP+ Ports); Backplane mapped to Serial Port
Operational Control	Control Input	To HP MSM765zl Mobility Controller	The shutdown switch causes the HP MSM765zl Mobility Controller to gracefully shut down. The device can also be controller through a web browser or a console.	Shutdown Switch; Backplane mapped to Ethernet LAN Ports (SFP+ Ports); Backplane mapped to Serial Port
Operational Status	Status Output	From HP MSM765zl Mobility Controller	Operational status is presented on the front panel status LEDs. A web browser interface and/or CLI present the current status of the HP MSM765zl Mobility Controller to the Administrator.	7 Status LEDs, Backplane mapped to Ethernet LAN Ports (SFP+ Ports); Backplane mapped to Serial Port
Input Data	Data Input	To HP MSM765zl Mobility Controller	Access Points are allowed to send data to the HP MSM765zl Mobility Controller over the Input Data interface.	Backplane mapped to Ethernet LAN Ports (SFP+ Ports)
Output Data	Data Output	From HP MSM765zl Mobility Controller	The HP MSM765zl Mobility Controller outputs data from Access Points over the Output Data interface.	Backplane mapped to Ethernet LAN Ports (SFP+ Ports)

Table 2 – Logical Interfaces Specific to the HP MSM765zl Mobility Controller

Interface	Type	Direction	Ports
Operational Control	Control Input	To Cryptographic Module	1 RS-232 DB9 Serial Port (to be covered with tamper evident seal) 1 Push Button 20 RJ45 Gig-T PoE+ Ports
Operational Status	Status Output	From Cryptographic Module	1 RS-232 DB9 Serial Port (to be covered with tamper evident seal) 32 LEDs on Management Module 20 RJ45 Gig-T PoE+ Ports 2 SFP+ Ports 44 LEDs (around ports) on Line Card 2 LEDs on Internal Power Supply (back of HP 5406 zl Switch only – single power supply) 4 LEDs on Internal Power Supplies (back of HP 5412 zl Switch only – two power supplies) 3 LEDs on Status Panel on Chassis 3 LEDs on High Performance Fan Tray (84 LEDs in total for HP 5406 zl Switch cryptographic module and 86 LEDs in total for HP 5412 zl Switch cryptographic module)
Input Data	Data Input	To Cryptographic Module	1 RS-232 DB9 Serial Port (to be covered with tamper evident seal) 20 RJ45 Gig-T PoE+ Ports 2 SFP+ Ports
Output Data	Data Output (disabled in the FIPS approved mode of operation)	From Cryptographic Module	1 RS-232 DB9 Serial Port (to be covered with tamper evident seal) 20 RJ45 Gig-T PoE+ Ports 2 SFP+ Ports
Power Interface	Power Input	To Cryptographic Module	1 AC Power Socket (HP 5406 zl Switch) 2 AC Power Sockets (HP 5412 zl Switch) 2 PoE Power Connectors

Interface	Type	Direction	Ports
Power Interface	Power Output	From Cryptographic Module	20 RJ45 Gig-T PoE+ Ports

Table 3 – Ports for the Rest of the HP 5406 zl Switch with the HP MSM765zl Mobility Controller and the HP 5412 zl Switch with the HP MSM765zl Mobility Controller Cryptographic Modules

Interface	Type	Direction	Ports
Operational Control	Control Input	To Cryptographic Module	1 RS-232 RJ45 Serial Port (to be covered with tamper evident seal) 1 Push Button 20 RJ45 Gig-T PoE+ Ports
Operational Status	Status Output	From Cryptographic Module	1 RS-232 RJ45 Serial Port (to be covered with tamper evident seal) 16 LEDs on Management Module 29 LEDs on System Support Module 20 RJ45 Gig-T PoE+ Ports 2 SFP+ Ports 44 LEDs (around ports) on Line Card 2 LEDs on Internal Power Supply (back of HP 8206 zl Switch only – single power supply) 4 LEDs on Internal Power Supplies (back of HP 8212 zl Switch only – two power supplies) 3 LEDs on Status Panel on Chassis 3 LEDs on High Performance Fan Tray (97 LEDs in total for HP 8206 zl Switch cryptographic module and 99 LEDs in total for HP 8212 zl Switch cryptographic module)

Interface	Type	Direction	Ports
Input Data	Data Input	To Cryptographic Module	1 RS-232 RJ45 Serial Port (to be covered with tamper evident seal) 20 RJ45 Gig-T PoE+ Ports 2 SFP+ Ports
Output Data	Data Output (disabled in the FIPS approved mode of operation)	From Cryptographic Module	1 RS-232 RJ45 Serial Port (to be covered with tamper evident seal) 20 RJ45 Gig-T PoE+ Ports 2 SFP+ Ports
Power Interface	Power Input	To Cryptographic Module	1 AC Power Socket (HP 8206 zl Switch) 2 AC Power Sockets (HP 8212 zl Switch) 2 PoE Power Connectors
Power Interface	Power Output	From Cryptographic Module	20 RJ45 Gig-T PoE+ Ports

Table 4 – Ports for the Rest of the HP 8206 zl Switch with the HP MSM765zl Mobility Controller and the HP 8212 zl Switch with the HP MSM765zl Mobility Controller Cryptographic Modules

2.3 OPACITY SHIELDS, HIGH PERFORMANCE FAN TRAYS, AND TAMPER EVIDENT SEALS

This section describes where the opacity shields and high performance fan trays shall be installed and where the tamper evident seals shall be affixed for each of the cryptographic modules to meet Physical Security Level 2.

Placement of the shields, fan trays, and seals is specific to the switch. The HP part numbers for the opacity shields are as follows:

J9710A HP 5406 zl Opacity Shield Kit;

J9711A HP 5412 zl Opacity Shield Kit;

J9712A HP 8206 zl Opacity Shield Kit; and

J9713A HP 8212 zl Opacity Shield Kit.

A high performance fan tray is also required for each switch. The HP part numbers for the fan trays are as follows:

J9721A	HP 5406 zl High Performance Fan Tray;
J9722A	HP 5412 zl High Performance Fan Tray;
J9723A	HP 8206 zl High Performance Fan Tray; and
J9724A	HP 8212 zl High Performance Fan Tray.

Refer to the installation instructions accompanying each part for details on how to attach the opacity shields and high performance fan tray to the switch chassis.

Please note that the configuration steps in section 3.2 FIPS Approved Mode of Operation, to functionally put the cryptographic module in the FIPS approved mode of operation, must be completed before installing the opacity shields and high performance fan trays and affixing the tamper evident seals.

2.3.1 General Instructions for Tamper Evident Seals

The surface to which any seal is applied must be clean and dry. The backing material from the seal must be peeled away without touching the adhesive. (Fingers should not be used to directly peel the seals.)

Place each seal on the required location, applying very firm pressure across the entire surface of the seal. Thirty minutes are needed for the adhesive to cure. Tamper evidence may not be apparent before this time and the controller must not be placed into operation until the curing time has expired.

If additional seals are required, the HP part number is J9709A. This kit has 120 seals. Extra seals must be stored in a secure location, with access available only to authorized Administrators.

The tamper evident seals, opacity shields, and high performance fan tray shall be installed for the module to operate in a FIPS approved mode of operation.

2.3.2 Tamper Evident Seal Placement on the Switch Chassis

This section describes where to affix the tamper evident seals on the top, bottom, back, and sides of each Ethernet switch chassis. Instructions for the placement of seals on the front of the chassis are provided in the following section.

2.3.2.1 Chassis Back

- Secure High Performance Fan Tray to Chassis with one seal.
- Secure each Power Supply to Chassis with one seal.
- Secure each Power Supply Blank Cover to Chassis.
- Seals required:
  - HP 5406 zl Switch: 4 tamper evident seals;
  - HP 5412 zl Switch: 7 tamper evident seals;
  - HP 8206 zl Switch: 4 tamper evident seals; and
  - HP 8212 zl Switch: 7 tamper evident seals.

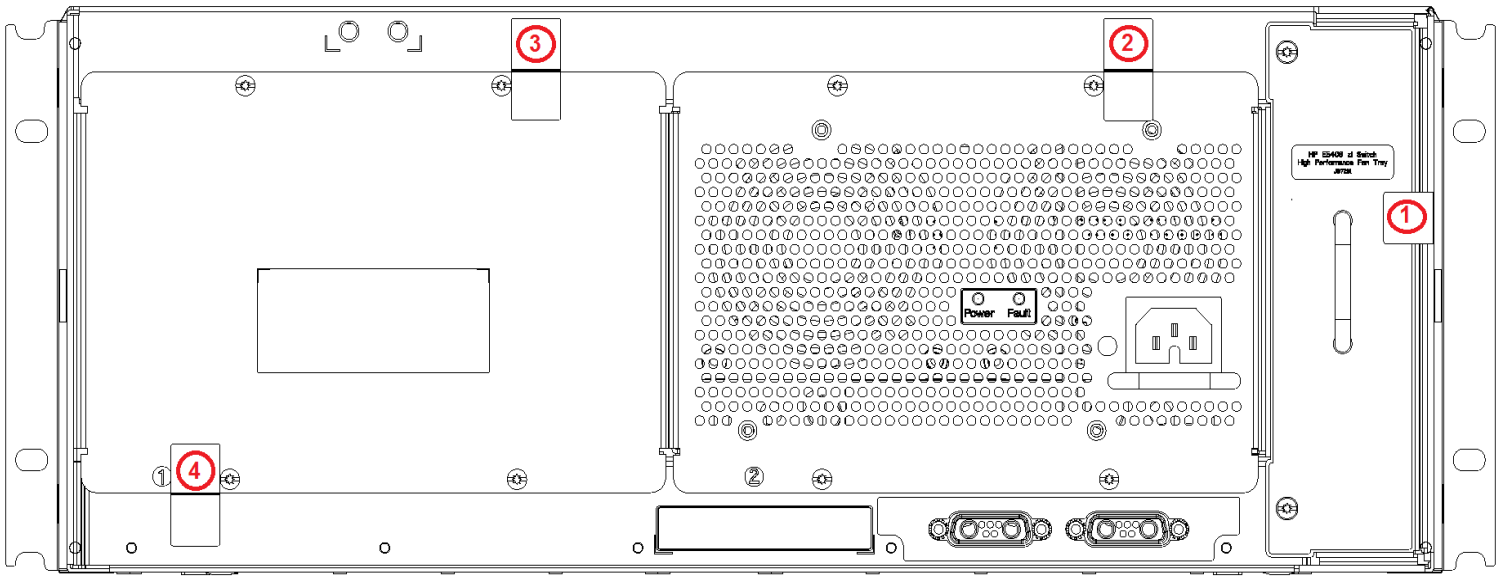


Figure 5 – Tamper Evident Seal Placement on Back of 5406 zl Chassis or 8206 zl Chassis

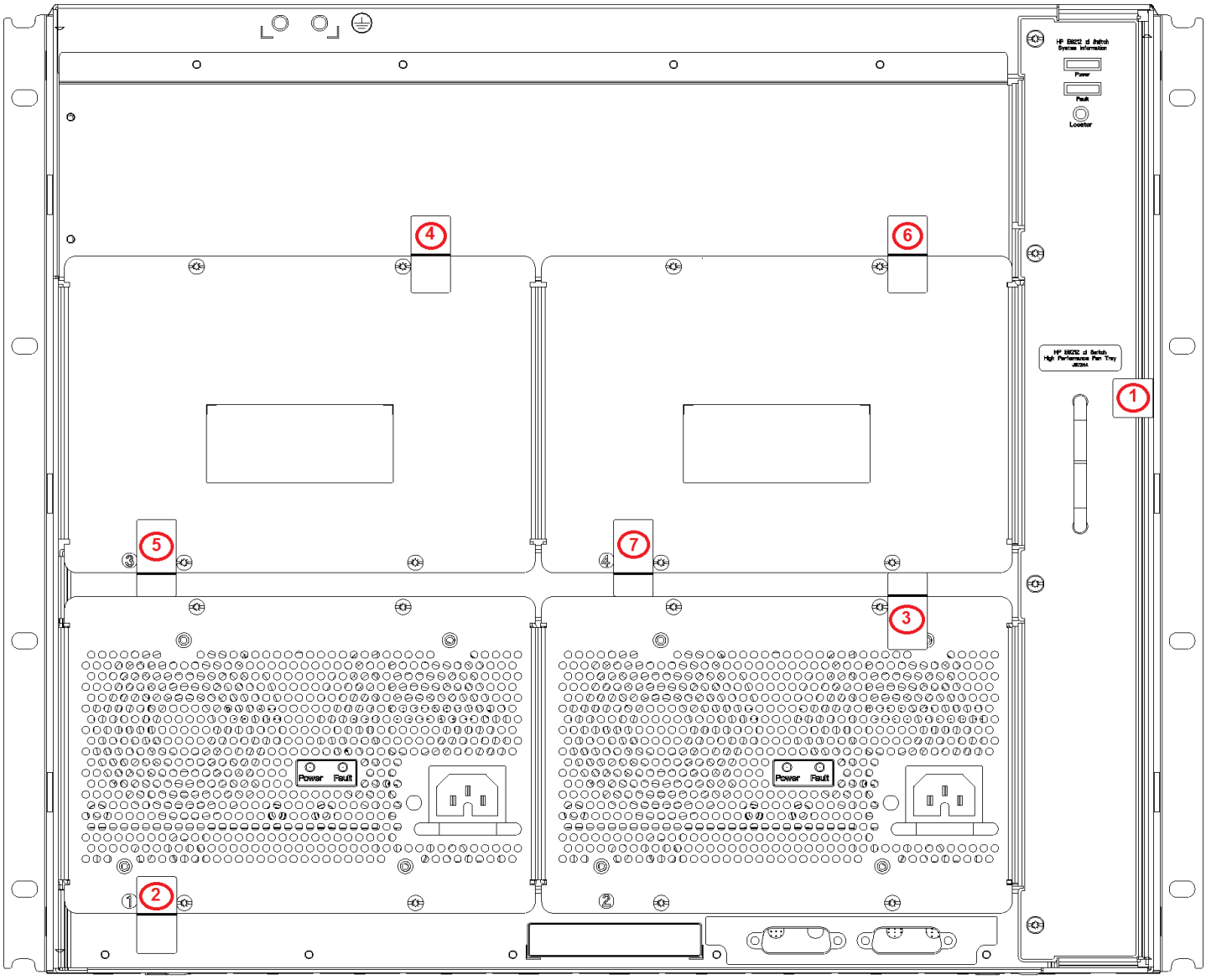


Figure 6 – Tamper Evident Seal Placement on Back of 5412 zl Chassis or 8212 zl Chassis

2.3.2.2 Chassis Sides

- Peel adhesive release liner off of Shield Clips and adhere to Rack Mounting Brackets.
- Assemble Rack Mounting Brackets on Chassis with four screws on each side.
- Secure Rack Mounting Brackets to Chassis with two tamper evident seals on each side.
- Assemble Opacity Shield into Shield Clips and secure with two screws on each side.

- Secure Opacity Shield to Chassis along top and bottom edges with six tamper evident seals on each side.
- Secure Opacity Shield to Chassis along front and rear edges with tamper evident seals at the shown locations on each side.
- Seals required to secure both left and right sides:

    - HP 5406 zl Switch: 22 tamper evident seals (seal numbers 5 to 26);
    - HP 5412 zl Switch: 26 tamper evident seals (seal numbers 8 to 33);
    - HP 8206 zl Switch: 24 tamper evident seals (seal numbers 5 to 28); and
    - HP 8212 zl Switch: 28 tamper evident seals (seal numbers 8 to 35).

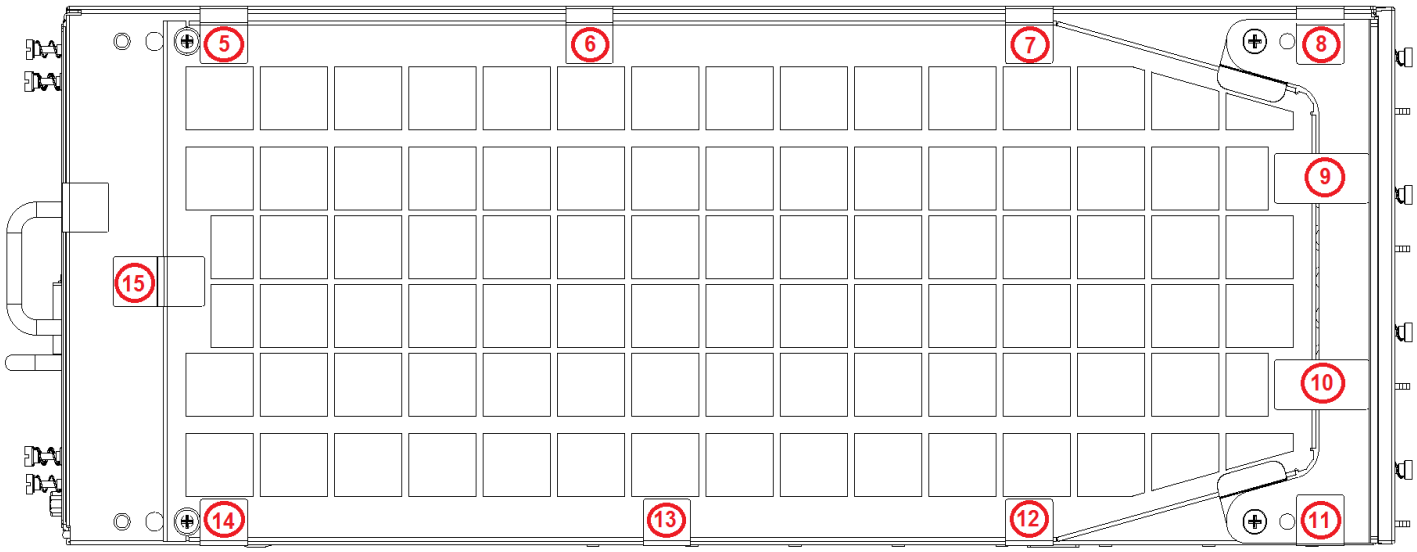


Figure 7 – Tamper Evident Seal Placement on Side of HP 5406 zl Switch Chassis (11 Seals on this Side)

The seal placement on the right side of the HP 5406 zl Switch Chassis is exactly the same as on the left side of the chassis which is shown in **Figure 7**. The seal numbers for the tamper evident seals on the right side of the HP 5406 zl Switch chassis are numbers 16 to 26 (11 tamper evident seals).

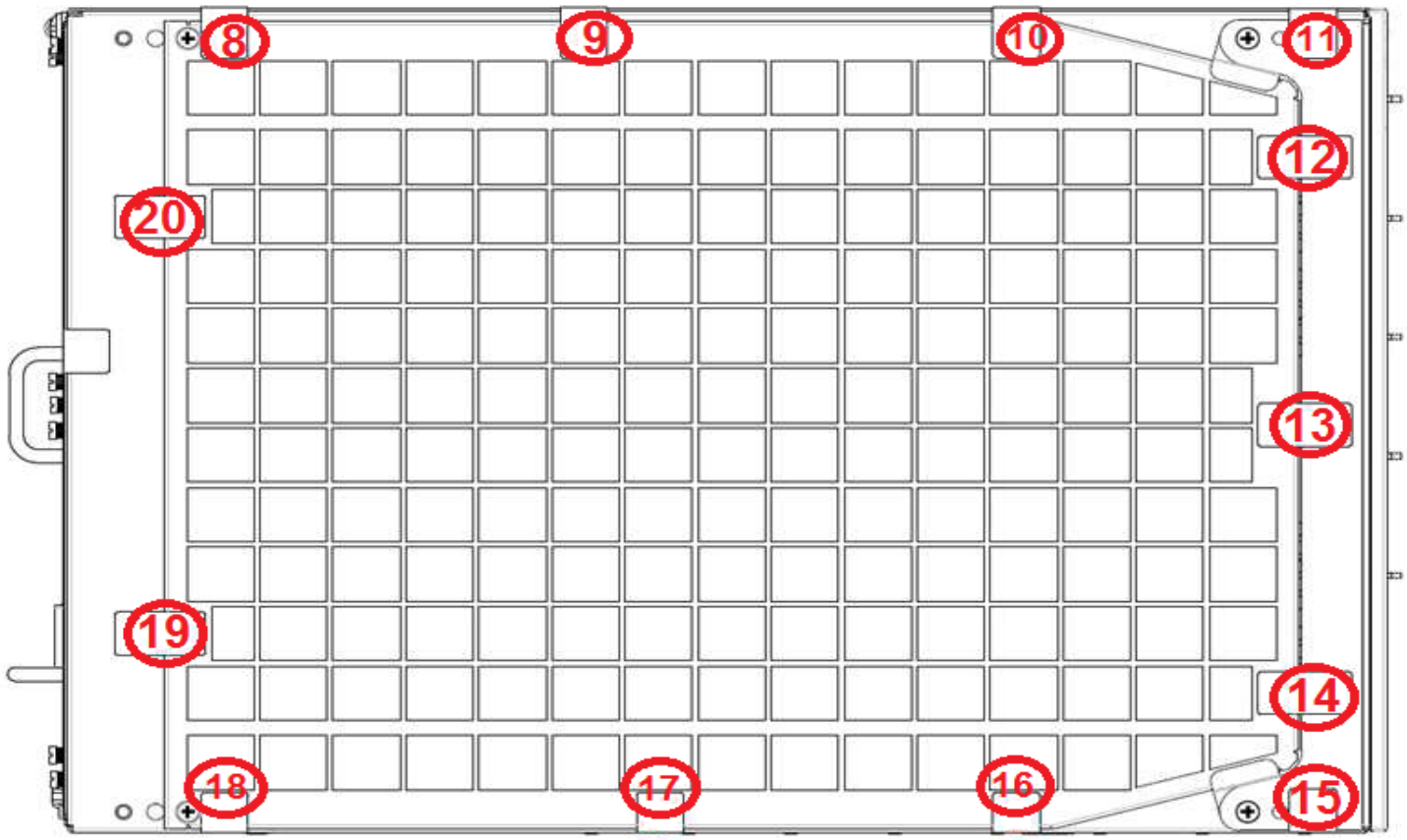


Figure 8 – Tamper Evident Seal Placement on Side of HP 5412 zl Switch Chassis (13 Seals on this Side)

The seal placement on the right side of the HP 5412 zl Switch Chassis is exactly the same as on the left side of the chassis which is shown in **Figure 8**. The seal numbers for the tamper evident seals on the right side of the HP 5412 zl Switch Chassis would be numbers 21 to 33 (13 tamper evident seals).

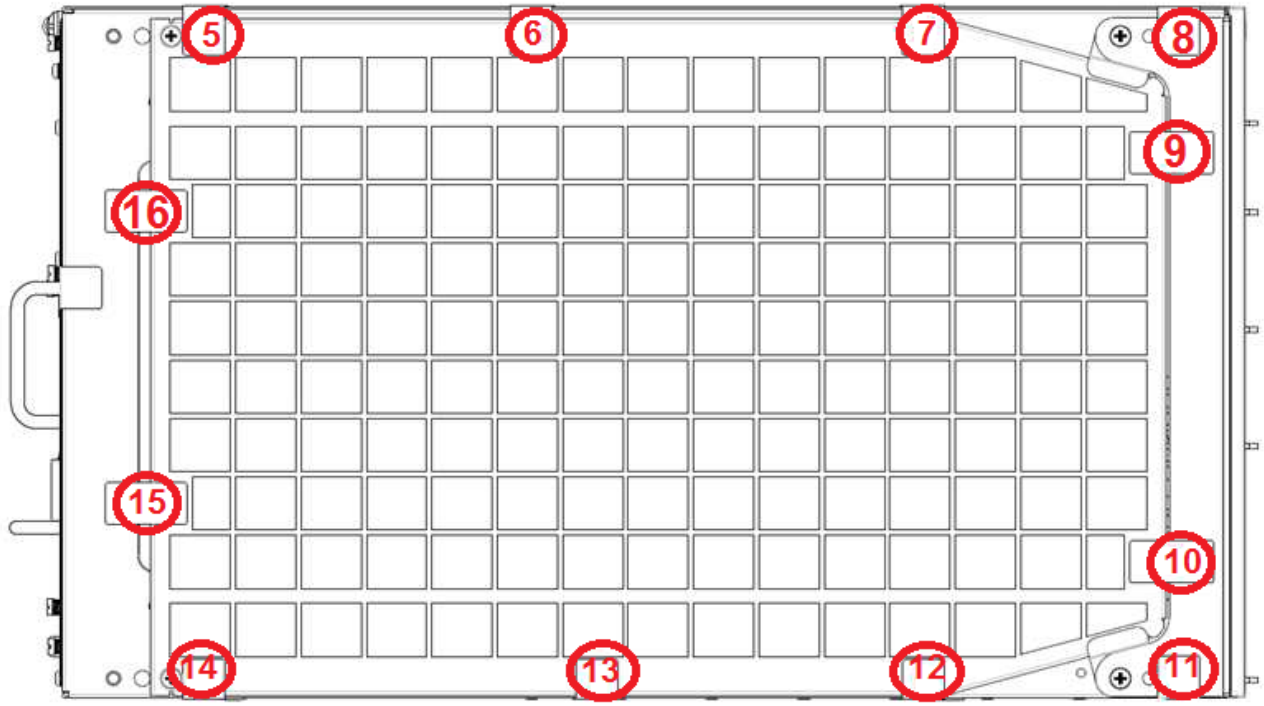


Figure 9 – Tamper Evident Seal Placement on Side of HP 8206 zl Switch Chassis (12 Seals on this Side)

The seal placement on the right side of the HP 8206 zl Switch Chassis is exactly the same as on the left side of the chassis which is shown in **Figure 9**. The seal numbers for the tamper evident seals on the right side of the HP 8206 zl Switch chassis would be numbers 17 to 28 (12 tamper evident seals).

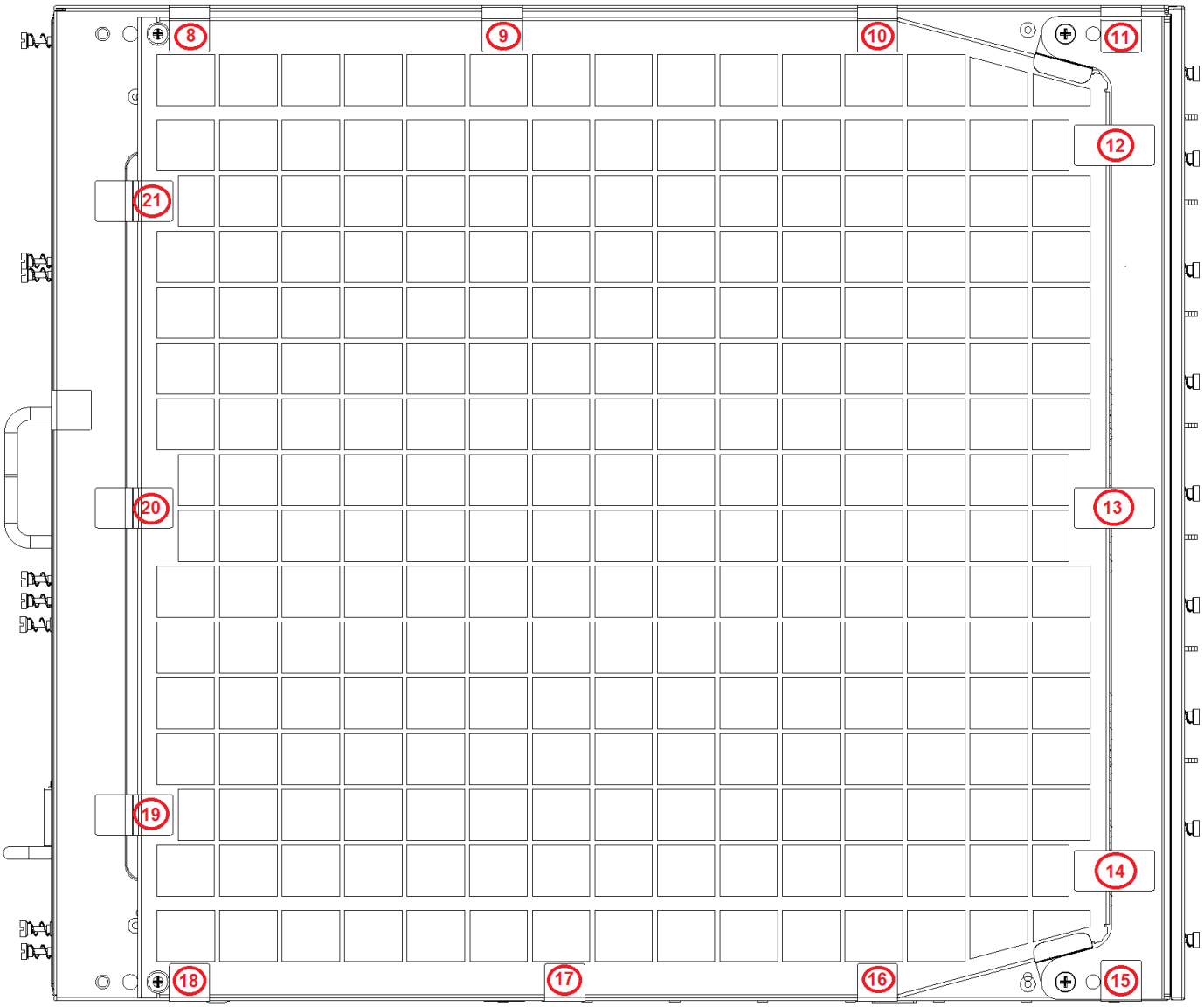


Figure 10 – Tamper Evident Seal Placement on Side of HP 8212 zl Switch Chassis (14 Seals on this Side)

The seal placement on the right side of the HP 8212 zl Switch Chassis is exactly the same as on the left side of the chassis which is shown in **Figure 10**. The seal numbers for the tamper evident seals on the right side of the HP 8212 zl Switch chassis would be numbers 22 to 35 (14 tamper evident seals).

2.3.2.3 Chassis Top

- Tamper evident seals cover viewing holes.
- Tamper evident seals required: 36 tamper evident seals (same for each chassis).

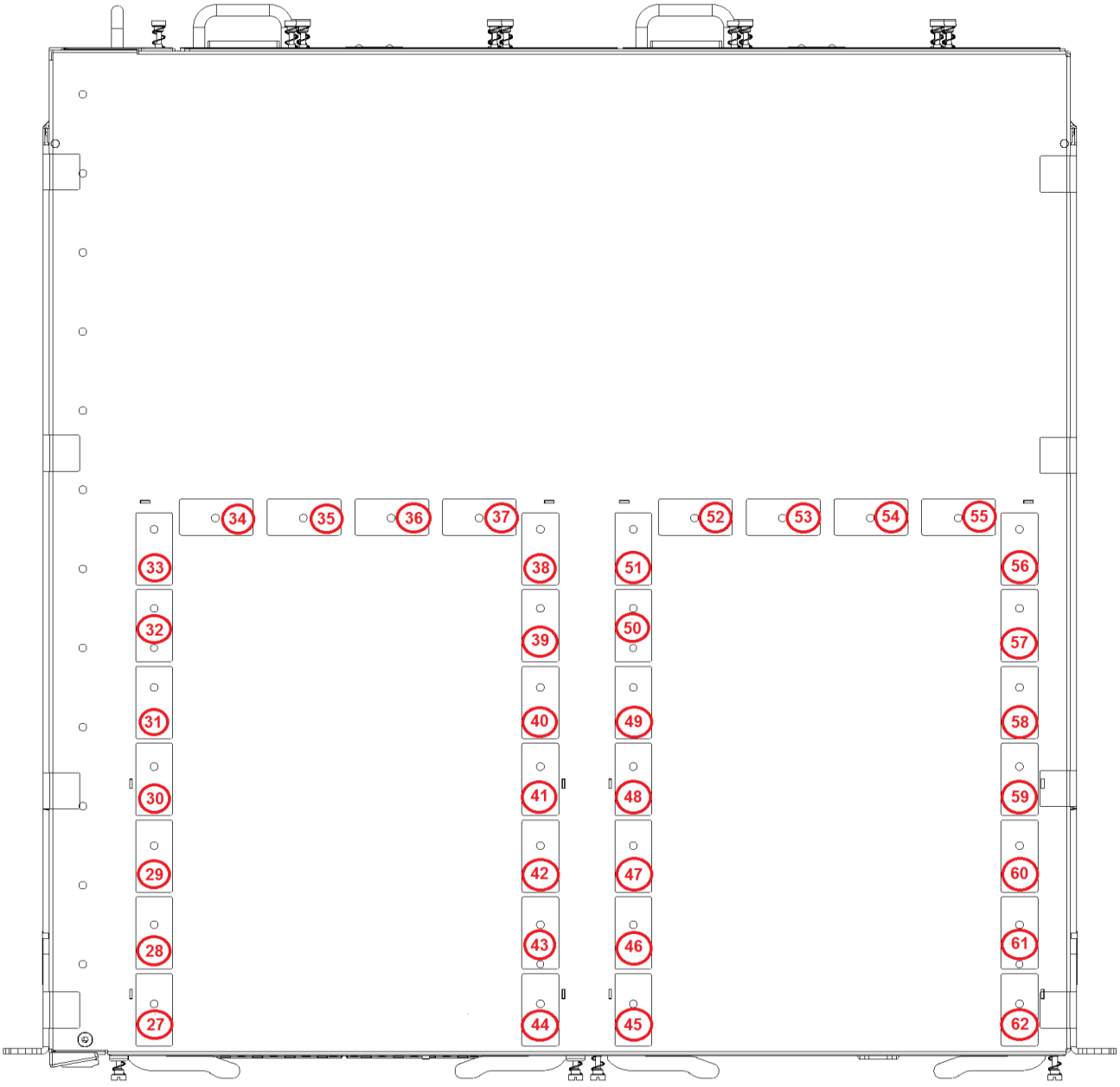


Figure 11 – Tamper Evident Seal Placement on Top of HP 5406 zl Switch Chassis (18 Seals per Three-Quarter Rectangle)

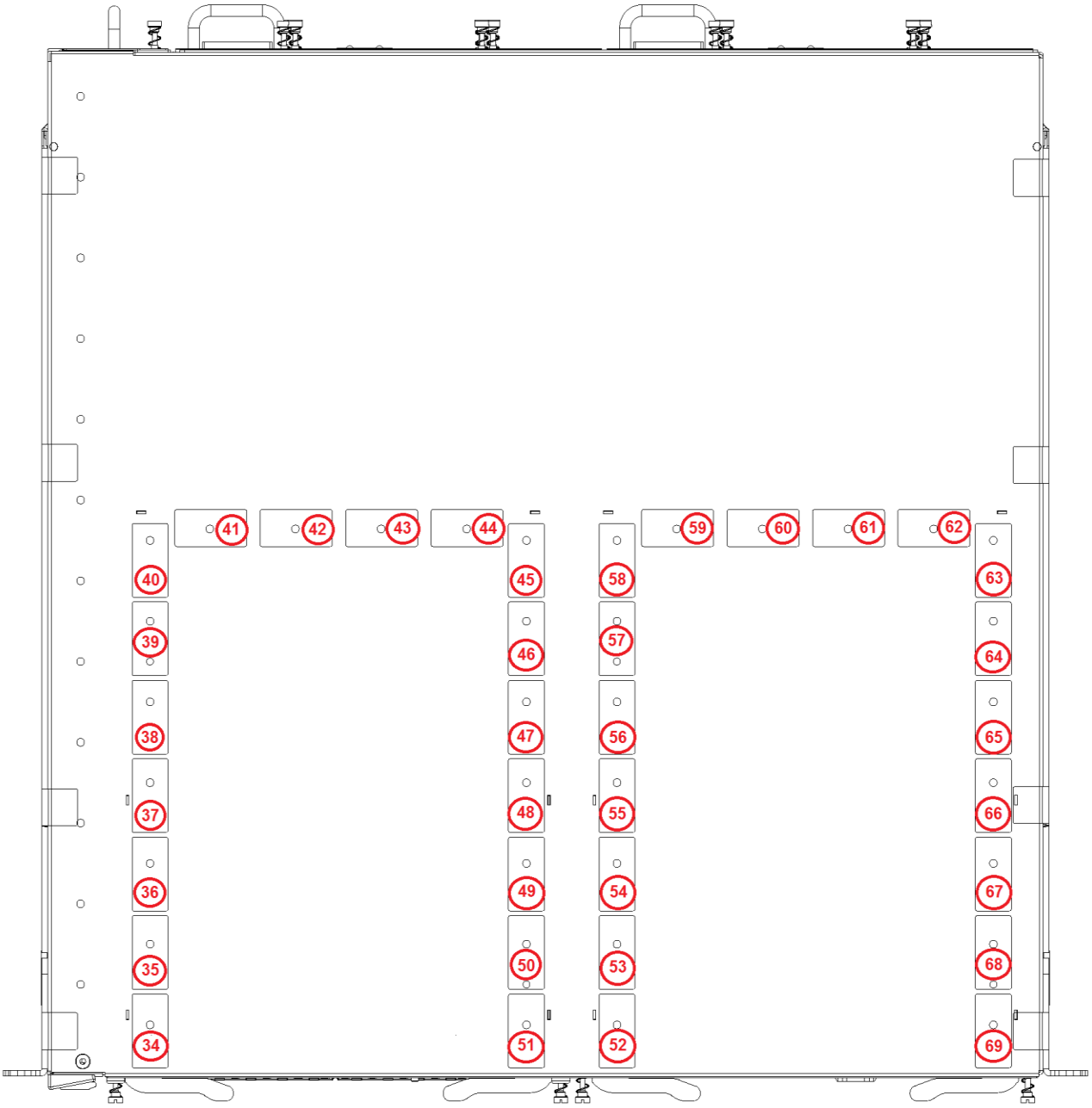


Figure 12 – Tamper Evident Seal Placement on Top of HP 5412 zl Switch Chassis (18 Seals per Three-Quarter Rectangle)

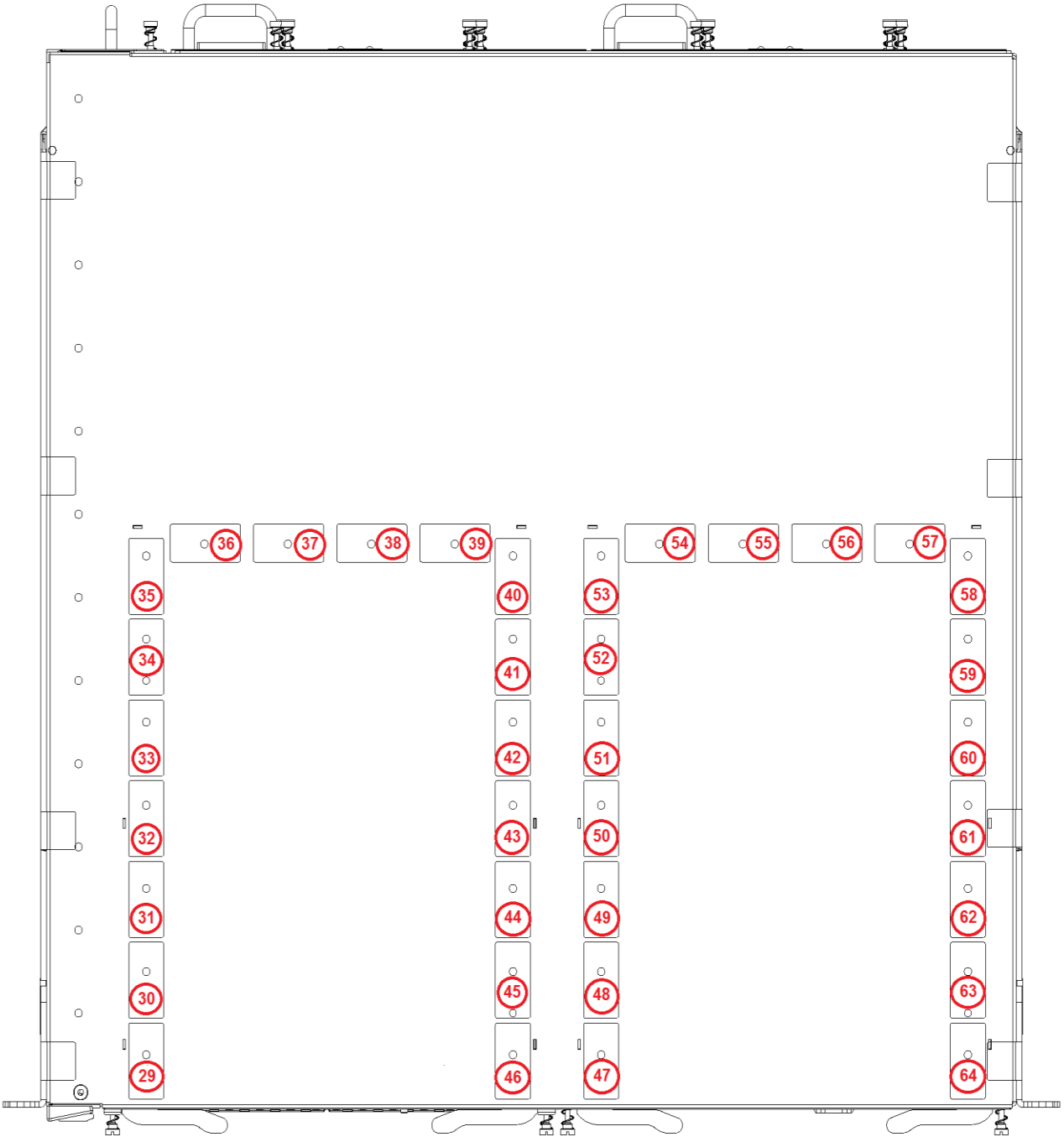


Figure 13 – Tamper Evident Seal Placement on Top of HP 8206 zl Switch Chassis (18 Seals per Three-Quarter Rectangle)

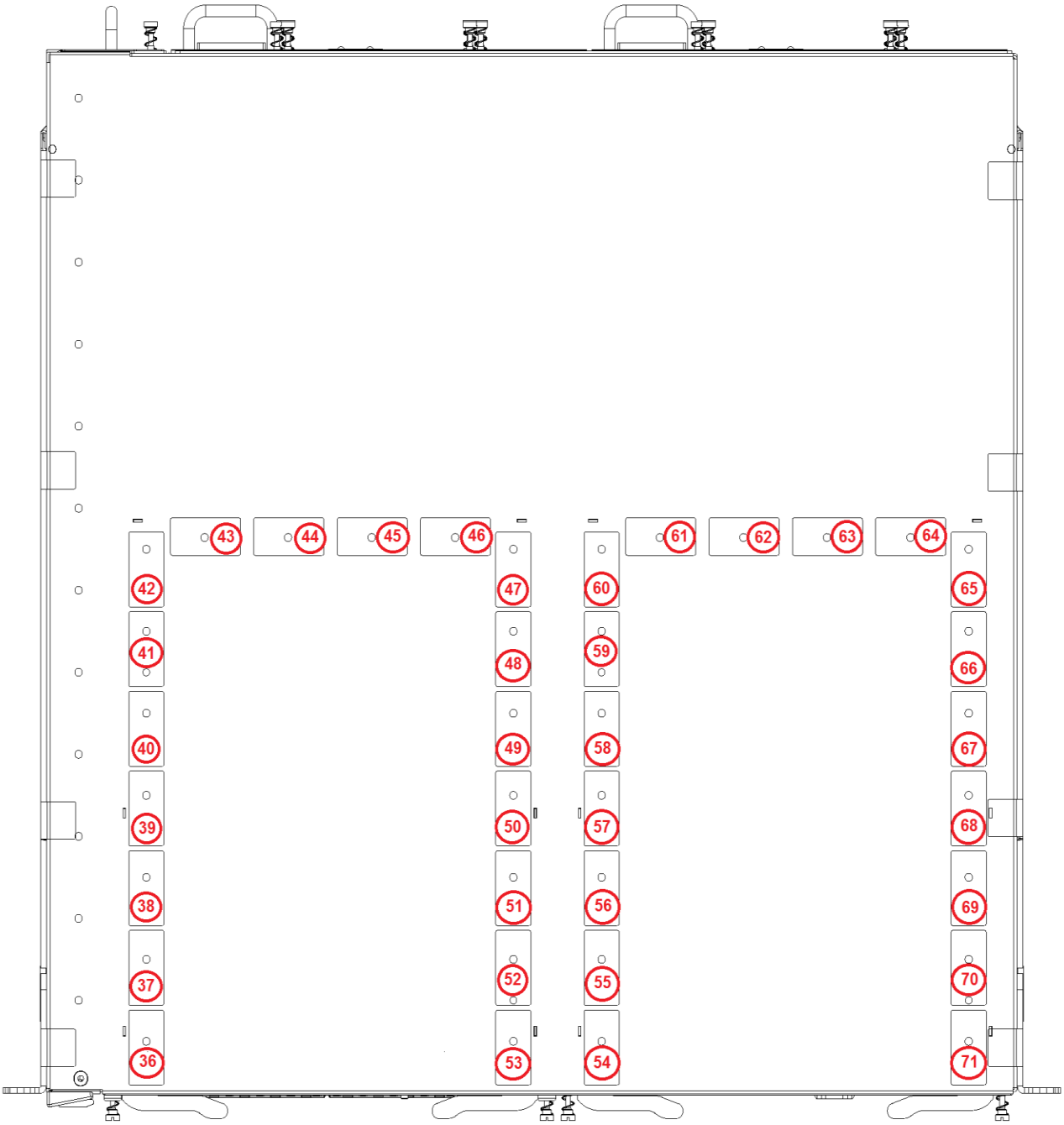


Figure 14 – Tamper Evident Seal Placement on Top of HP 8212 zl Switch Chassis (18 Seals per Three-Quarter Rectangle)

2.3.2.4 Chassis Bottom

- Tamper evident seals cover viewing holes.
- Tamper evident seals required: 12 (same for each chassis).

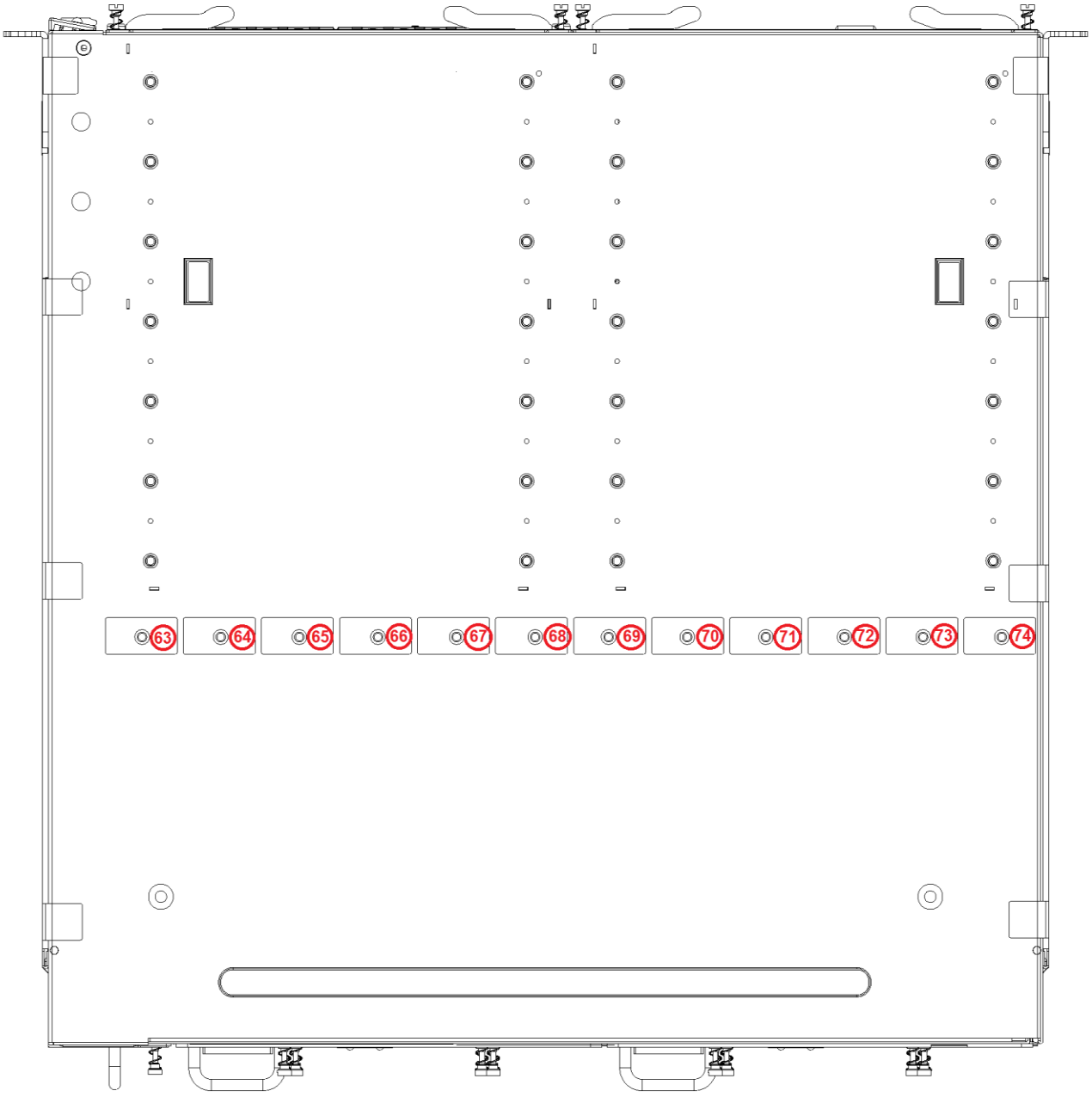


Figure 15 – Tamper Evident Seal Placement on Bottom of HP 5406 zl Switch Chassis (12 Seals in Single Line)

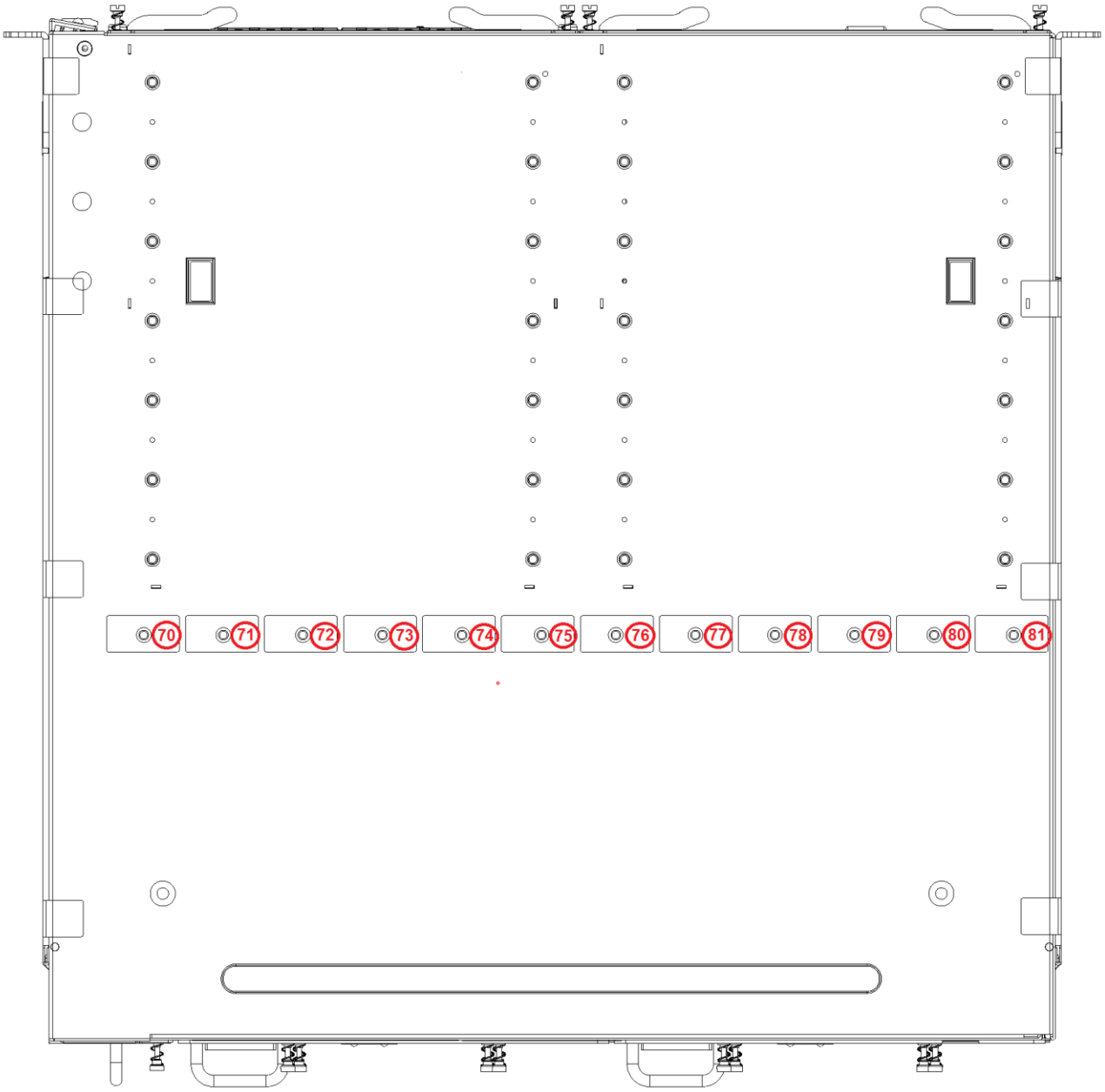


Figure 16 – Tamper Evident Seal Placement on Bottom of HP 5412 zl Switch Chassis (12 Seals in Single Line)

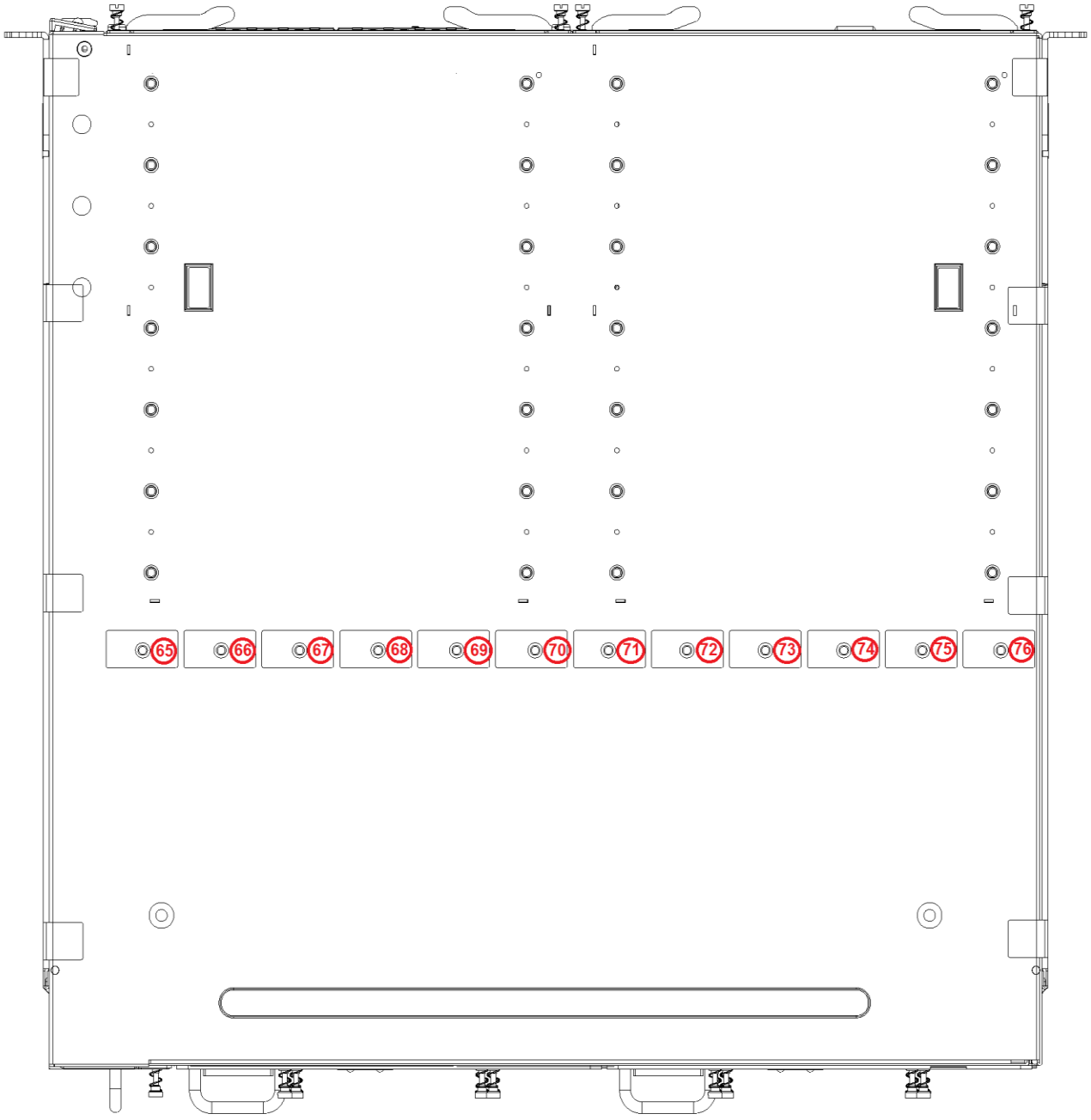


Figure 17 – Tamper Evident Seal Placement on Bottom of HP 8206 zl Switch Chassis (12 Seals in Single Line)

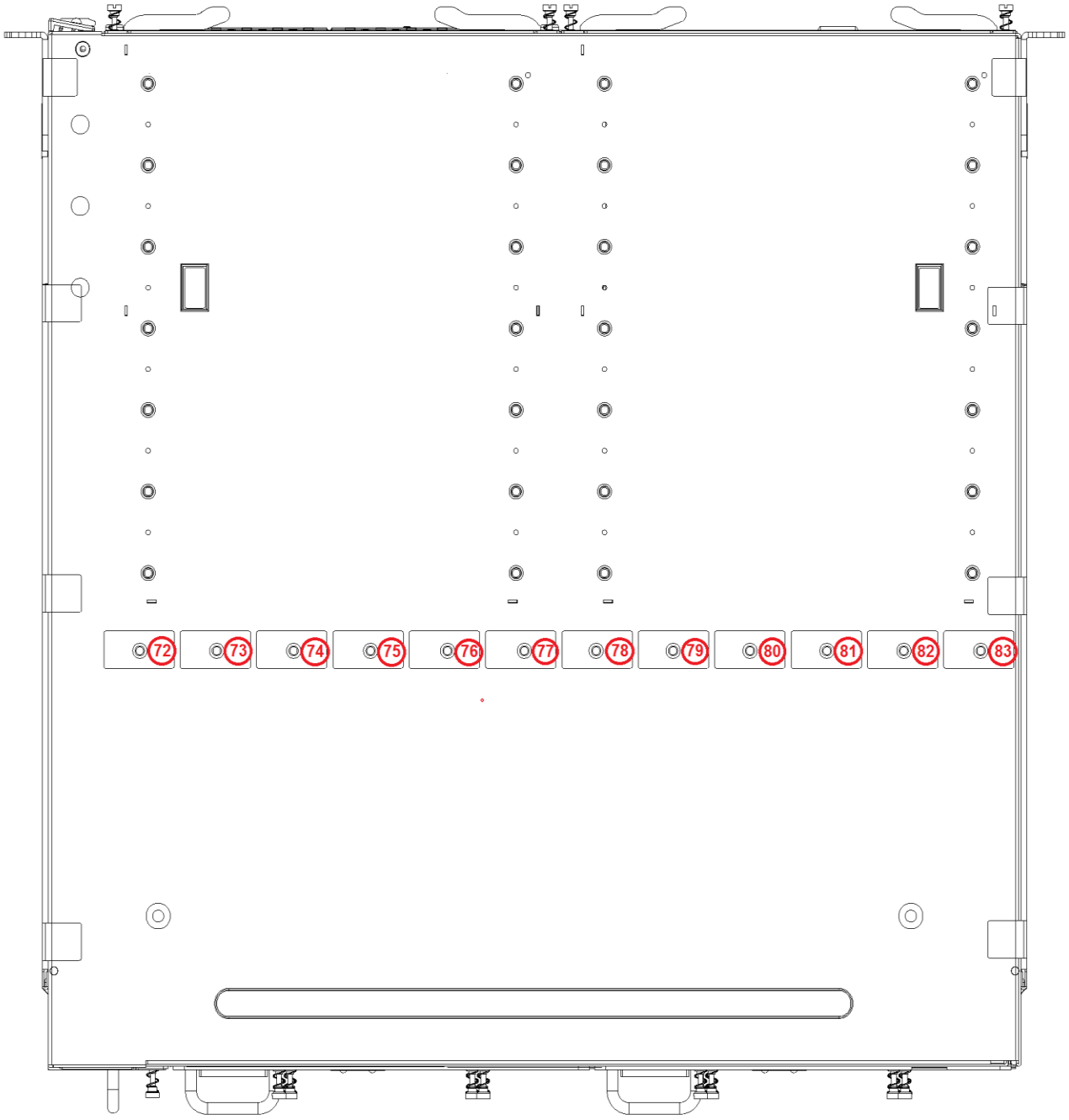


Figure 18 – Tamper Evident Seal Placement on Bottom of HP 8212 zl Switch Chassis (12 Seals in Single Line)

2.4 TAMPER EVIDENT SEAL PLACEMENT ON CHASSIS FRONT AND INSTALLED MODULES

This section provides instructions on the placement of tamper evident seals on the front of the chassis including installed modules and blank slot covers. Please note that tamper evident seals on the right side are to be applied at an angle to avoid rack mounting screws.

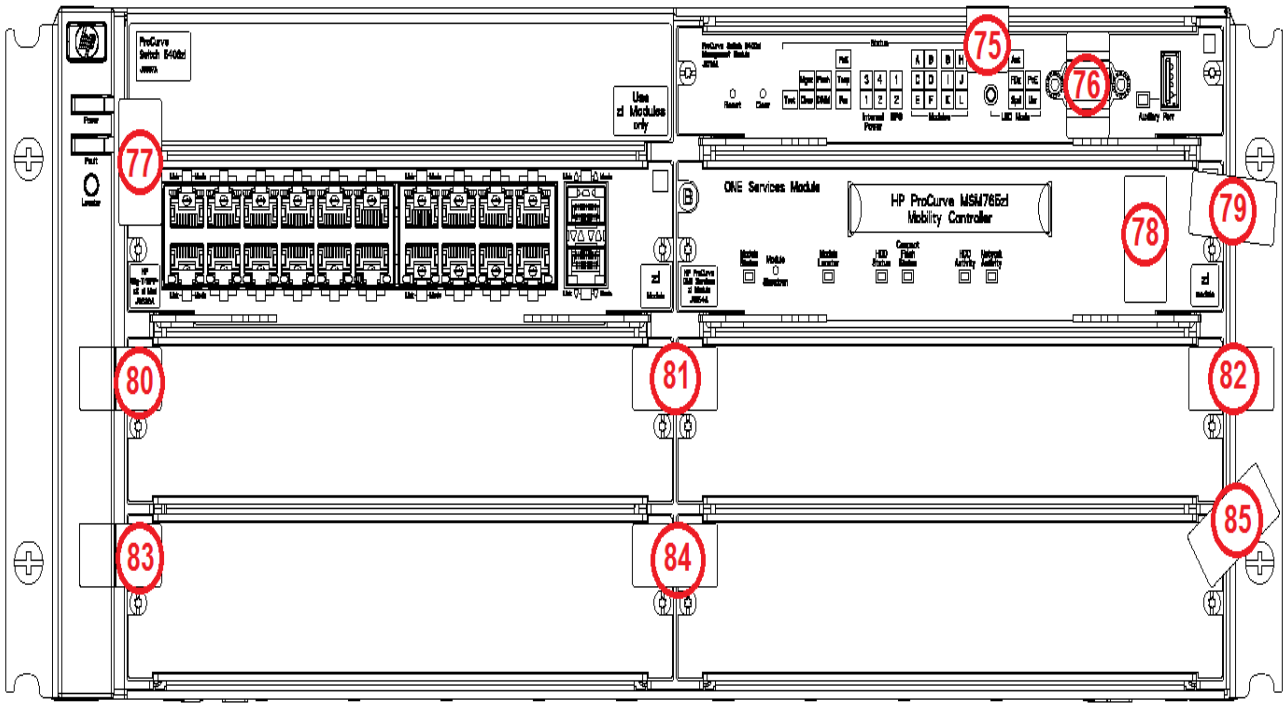


Figure 19 – Placement of Tamper Evident Seals on Front of the HP 5406 zl Switch with the MSM765zl Mobility Controller (11 Seals)

Please note that the Management Module is to be secured to the top of the chassis and the serial port on the Management Module is to be covered. Blank plates require tamper evident seals on both sides of the plate. The USB port on the MSM765zl Mobility Controller is to be covered with a tamper evident seal.

The HP 5406 zl Switch with the MSM765zl Mobility Controller requires a total of 85 tamper evident seals to meet the Physical Security Level 2 opacity requirements.

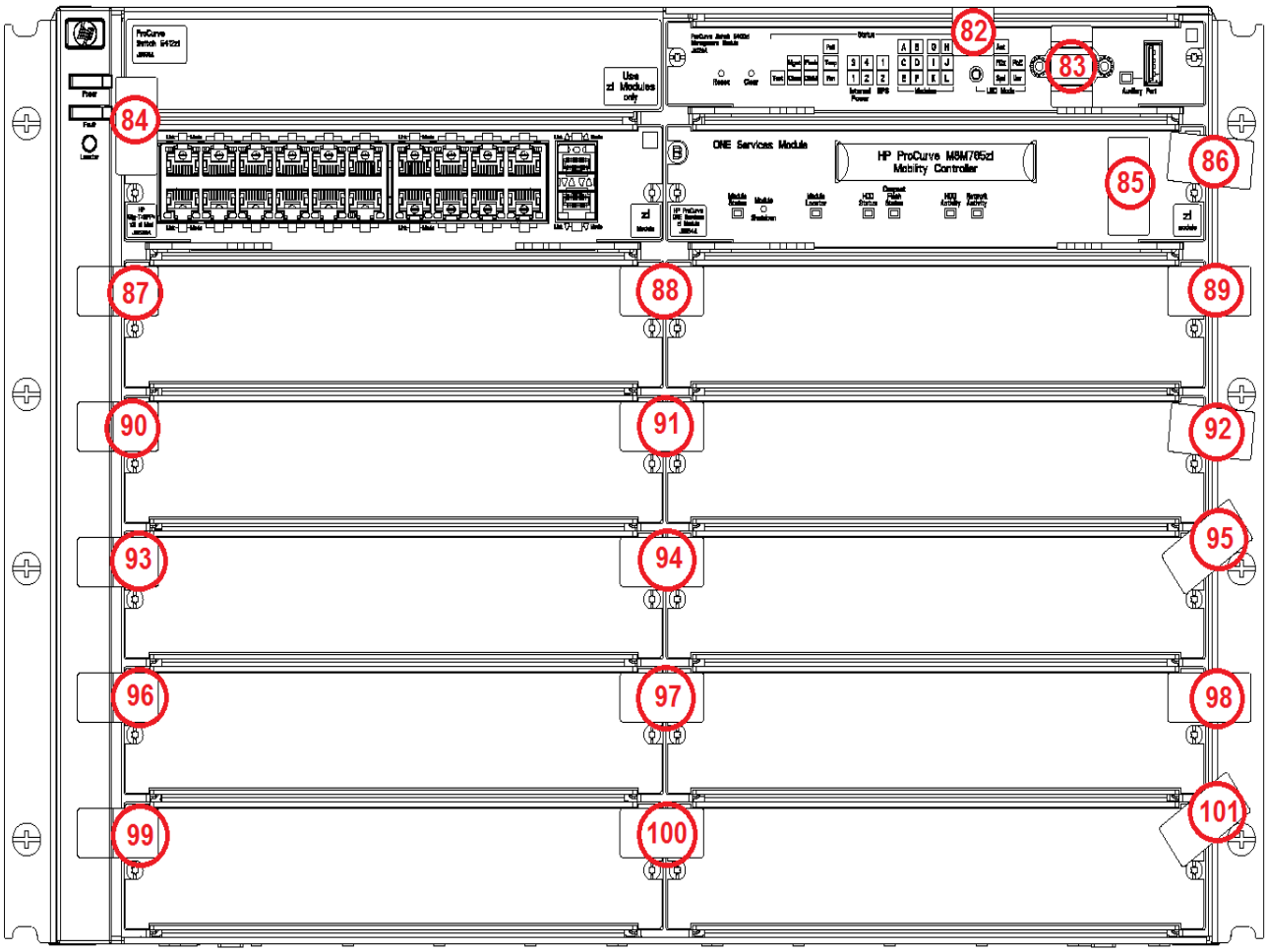


Figure 20 – Placement of Tamper Evident Seals on Front of the HP 5412 zl Switch with the MSM765zl Mobility Controller (20 Seals)

Please note that the Management Module is to be secured to the top of the chassis and the serial port on the Management Module is to be covered. Blank plates require tamper evident seals on both sides of the plate. The USB port on the MSM765zl Mobility Controller is to be covered with a tamper evident seal.

The HP 5412 zl Switch with the MSM765zl Mobility Controller requires a total of 101 tamper evident seals to meet the Physical Security Level 2 opacity requirements.

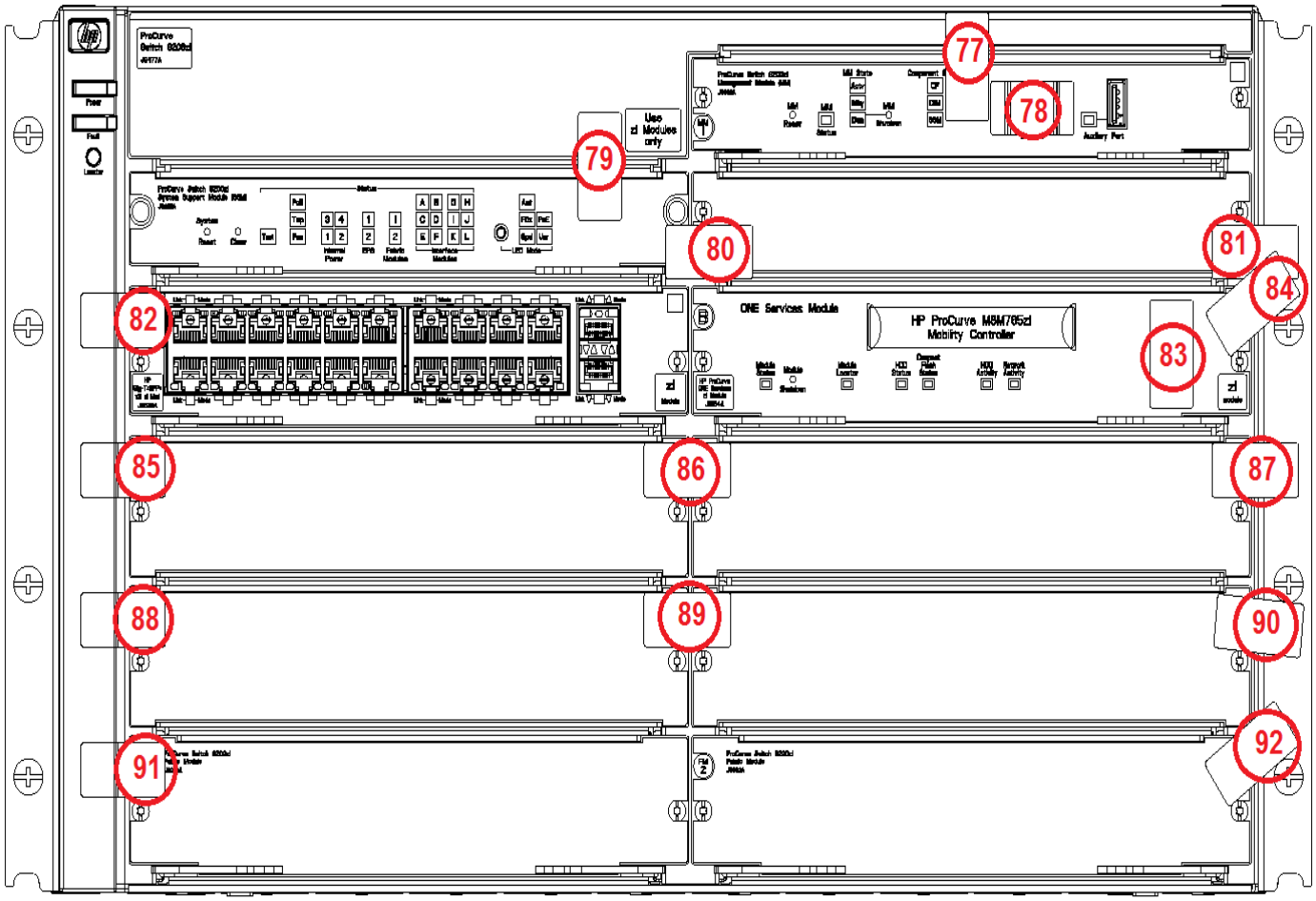


Figure 21 – Placement of Tamper Evident Seals on Front of the HP 8206 zl Switch with the MSM765zl Mobility Controller (16 Seals)

Please note that the Management Module is to be secured to the top of the chassis and the serial port on the Management Module is to be covered. The System Support Module requires a seal on its right side as well as a seal to secure it to the switch. Blank plates require tamper evident seals on both sides of the plate. The USB port on the MSM765zl Mobility Controller is to be covered with a tamper evident seal.

The HP 8206 zl Switch with the MSM765zl Mobility Controller requires a total of 92 tamper evident seals to meet the Physical Security Level 2 opacity requirements.

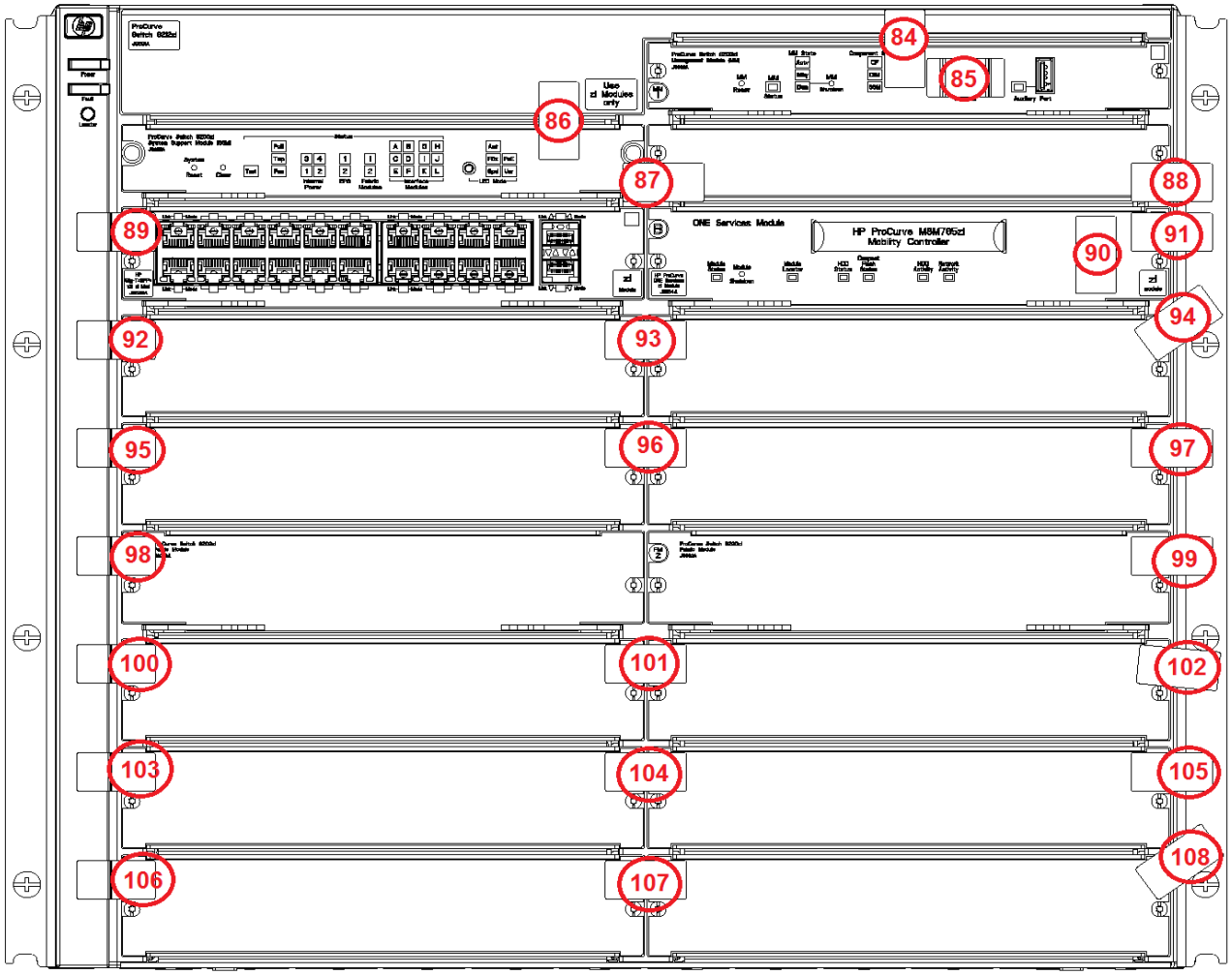


Figure 22 – Placement of Tamper Evident Seals on Front of the HP 8212 zl Switch with the MSM765zl Mobility Controller (25 Seals)

Please note that the Management Module is to be secured to the top of the chassis and the serial port on the Management Module is to be covered. The System Support Module requires a seal on its right side as well as a seal to secure it to the switch. Blank plates require tamper evident seals on both sides of the plate. The USB port on the MSM765zl Mobility Controller is to be covered with a tamper evident seal.

The HP 8212 zl Switch with the MSM765zl Mobility Controller requires a total of 108 tamper evident seals to meet the Physical Security Level 2 opacity requirements.

2.5 CRYPTOGRAPHIC MODULE BOUNDARY

The cryptographic module boundary of the four cryptographic modules – the HP 5406 zl Switch with the HP MSM765zl Mobility Controller, the HP 5412 zl Switch with the HP MSM765zl Mobility Controller, the HP 8206 zl Switch with the HP MSM765zl Mobility Controller, and the HP 8212 zl Switch with the HP MSM765zl Mobility Controller – is the chassis of their respective switches, that is the following:

- the HP 5406 zl Switch Chassis for the HP 5406 zl Switch with the HP MSM765zl Mobility Controller;
- the HP 5412 zl Switch Chassis for the HP 5412 zl Switch with the HP MSM765zl Mobility Controller;
- the HP 8206 zl Switch Chassis for the HP 8206 zl Switch with the HP MSM765zl Mobility Controller; and
- the HP 8212 zl Switch Chassis for the HP 8212 zl Switch with the HP MSM765zl Mobility Controller.

The cryptographic modules are all multiple-chip standalone cryptographic modules.

3 PRODUCT OPERATION

3.1 OVERVIEW

The HP MSM765zl Mobility Controller is the component in the cryptographic modules that will be providing cryptographic services while the cryptographic module is in the FIPS approved mode of operation. The HP MSM765zl Mobility Controller is a general-purpose device whose operational mode is configurable through an administrative interface.

The following section describes how to operate the cryptographic module in the FIPS approved mode of operation. The *HP MSM765zl Mobility Controller Installation and Getting Started Guide* or the *HP MSM7xx Controllers Management and Configuration Guide* can be consulted for a complete discussion of the operation of the HP MSM765zl Mobility Controller. The *HP ProCurve 5400zl Switches Installation and Getting Started Guide* provides information on the installation of the HP 5406 zl and HP 5412 zl Switches and the *HP 8200 zl Switches Installation and Getting Started Guide* provides information on the installation of the HP 8206 zl and HP 8212 zl Switches.

3.2 FIPS APPROVED MODE OF OPERATION

3.2.1 Description

The FIPS approved mode of operation is a special configuration of the cryptographic module, in which:

a. The cryptographic module is configured to operate in the FIPS 140-2 approved mode;
b. The tamper evident seals, opacity shields, and high performance fan trays are installed as prescribed;
c. The (optional) RADIUS authentication operates over an IPSec protected link; and
d. The (optional) SNMP management of the unit operates over an IPSec protected link.

The instructions for configuring the HP MSM765zl Mobility Controller in the switch in the FIPS 140-2 approved mode of operation are provided in section **3.2.2**. The following preliminary steps must be completed prior to configuring the HP MSM765zl Mobility Controller to operate in the FIPS approved mode of operation:

1. Configure the HP 5406 zl Switch, HP 5412 zl Switch, HP 8206 zl Switch, or HP 8212 zl Switch, as appropriate for your network.
2. If necessary, update the switch firmware to the switch firmware covered as part of this validation.
3. Install only one HP MSM765zl Mobility Controller in the switch chassis, and configure basic IP addressing and VLAN information, as appropriate for your network.

4. To prevent unintentional factory reset of the switch, the "Reset" button located on the Management Card of the HP 5406 zl Switch or the HP 5412 zl Switch, or located on the System Support Module of the HP 8206 zl Switch or the HP 8212 zl Switch, must be disabled. The Crypto-Officer must confirm the prompt with a 'y' to complete the command. For example:

   ```
   HP-E8212zl(config)# no front-panel-security factory-reset
   **** CAUTION ****
   Disabling the factory reset option prevents switch configuration
   and passwords from being easily reset or recovered. Ensure that
   you are familiar with the front panel security options before
   proceeding.
   Continue with disabling the factory reset option[y/n]? y
   ```

5. To prevent unintentional password reset of the switch, the "Clear" button located on the Management Card of the HP 5406 zl Switch or the HP 5412 zl Switch, or located on the System Support Module of the HP 8206 zl Switch or the HP 8212 zl Switch, must be disabled. The Crypto-Officer must confirm the prompt with a 'y' to complete the command. For example:

   ```
   HP-E8212zl(config)# no front-panel-security password-clear
   **** CAUTION ****
   Disabling the clear button prevents switch passwords from being
   easily reset or recovered. Ensure that you are familiar with the
   front panel security options before proceeding.
   Continue with disabling the clear button [y/n]? y
   ```

6. The auxiliary port located on the Management Card must be disabled avoid any unauthorized modifications to the cryptographic module.
   Please note: The autorun feature will not function when the USB port is disabled.
   For example:

   ```
   HP-E8212zl(config)# no usb-port
   ```

7. Remove IP address from HP 5406 zl Switch, HP 5412 zl Switch, HP 8206 zl Switch, or HP 8212 zl Switch, as appropriate for your network (e.g. IP addressing). This will require two commands:

   - For each vlan – "no ip address"; and
   - For each vlan – "no Ipv6 address".

The following HP documents may be of assistance in completing the above:

- *HP ProCurve 5400zl Switches Installation and Getting Started Guide*;
- *HP 8200 zl Switches Installation and Getting Started Guide*;
- *HP MSM765zl Mobility Controller Installation and Getting Started Guide*;
- *HP MSM7xx Controllers Management and Configuration Guide*; and
- Release notes that accompany any firmware update(s) installed.

Please note that to run the cryptographic module in the non-FIPS approved mode of operation after it is configured in the FIPS approved mode of operation, the operator shall first reset the HP MSM765zl Mobility Controller to the factory default configuration.

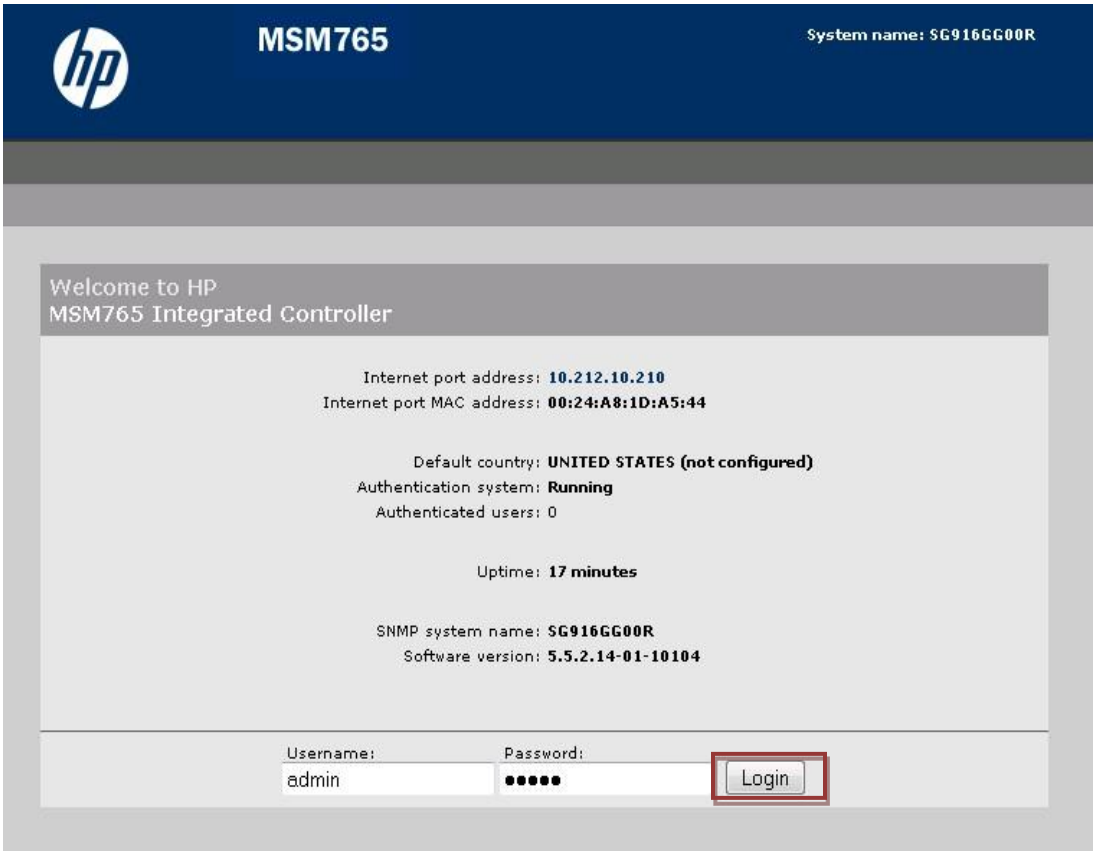
3.2.2 Instructions for Putting the HP MSM765zl Mobility Controller into the FIPS Approved Mode of Operation

3.2.2.1 Initial Assumptions

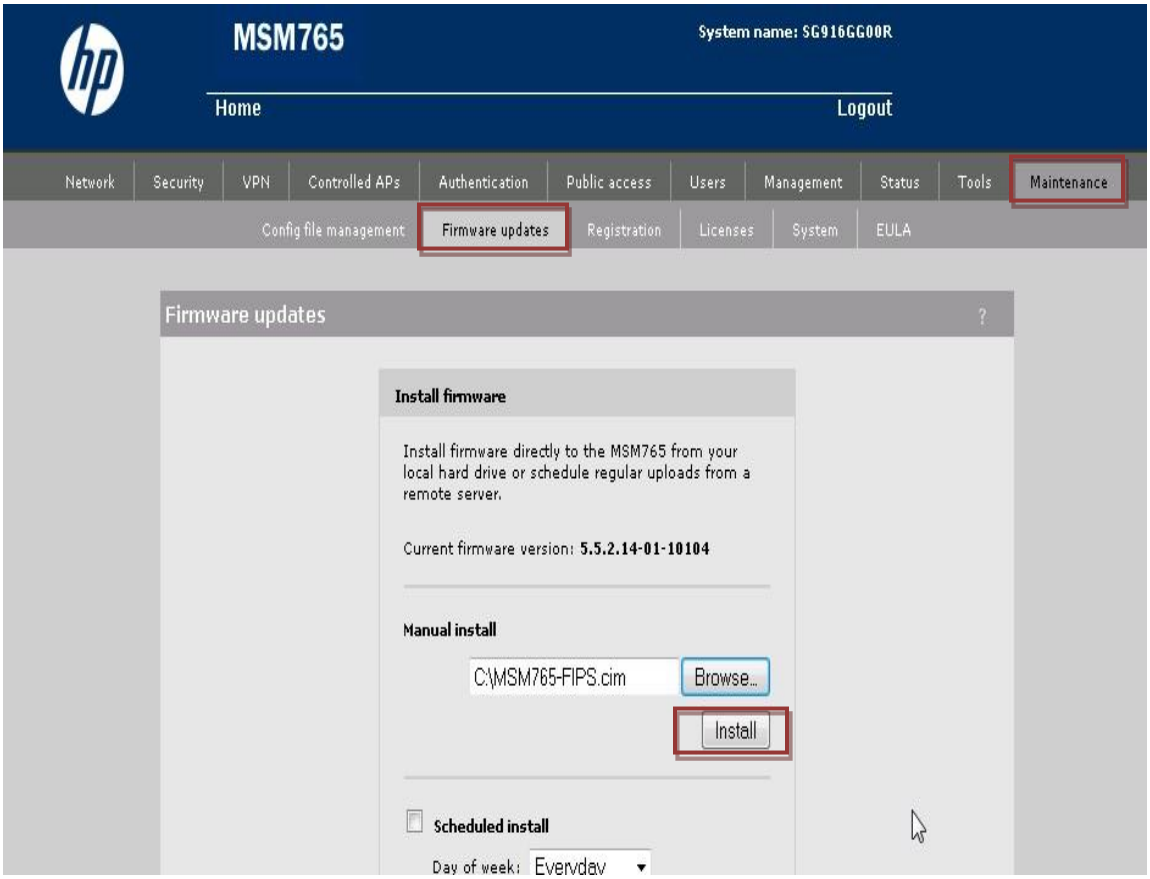
- The HP MSM765zl Mobility Controller does not have the FIPS validated firmware installed.
- There are no access points currently being discovered or managed by the HP MSM765zl Mobility Controller.
- The administrator knows how to use the CLI from the chassis to configure an IP address on the controller in the case where the unit is brand new or it has been factory reset.

STEP 1: LOAD THE FIPS VALIDATED FIRMWARE ON THE CONTROLLER

- Login to the HP MSM765zl Mobility Controller through the web using the default username "admin" and password "admin" credentials.



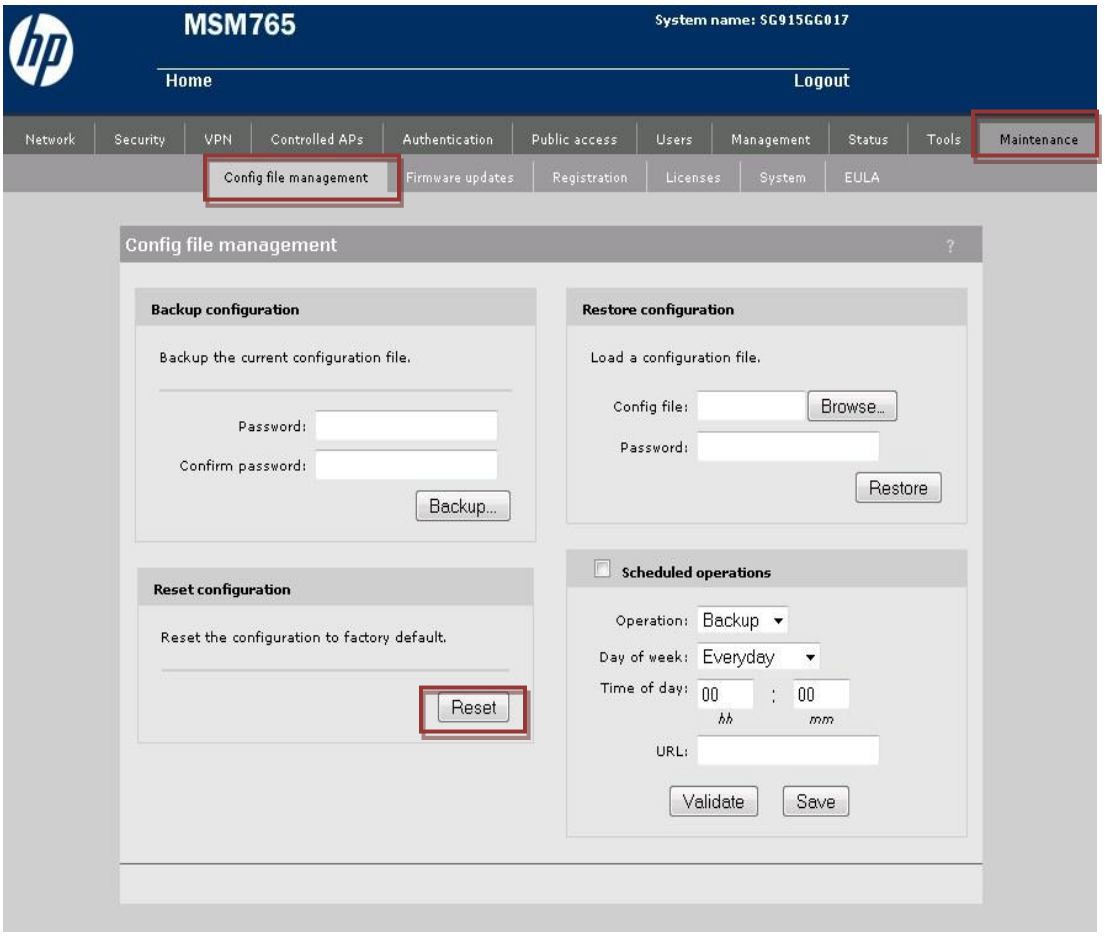
- Select and install the FIPS validated firmware.



After the firmware is installed, the HP MSM765zl Mobility Controller will reboot. It may be necessary to type the address of the controller directly to get the home page because the FIPS-validated firmware will have installed a new default web certificate, which interferes with the JavaScript automatic reloading of the home page. Once the home page displays, it can be verified that the version installed is the correct one by checking the specified "Software version". Note that the CMVP considers the executables to be firmware, whereas, in generic IT terminology, they are considered to be software.

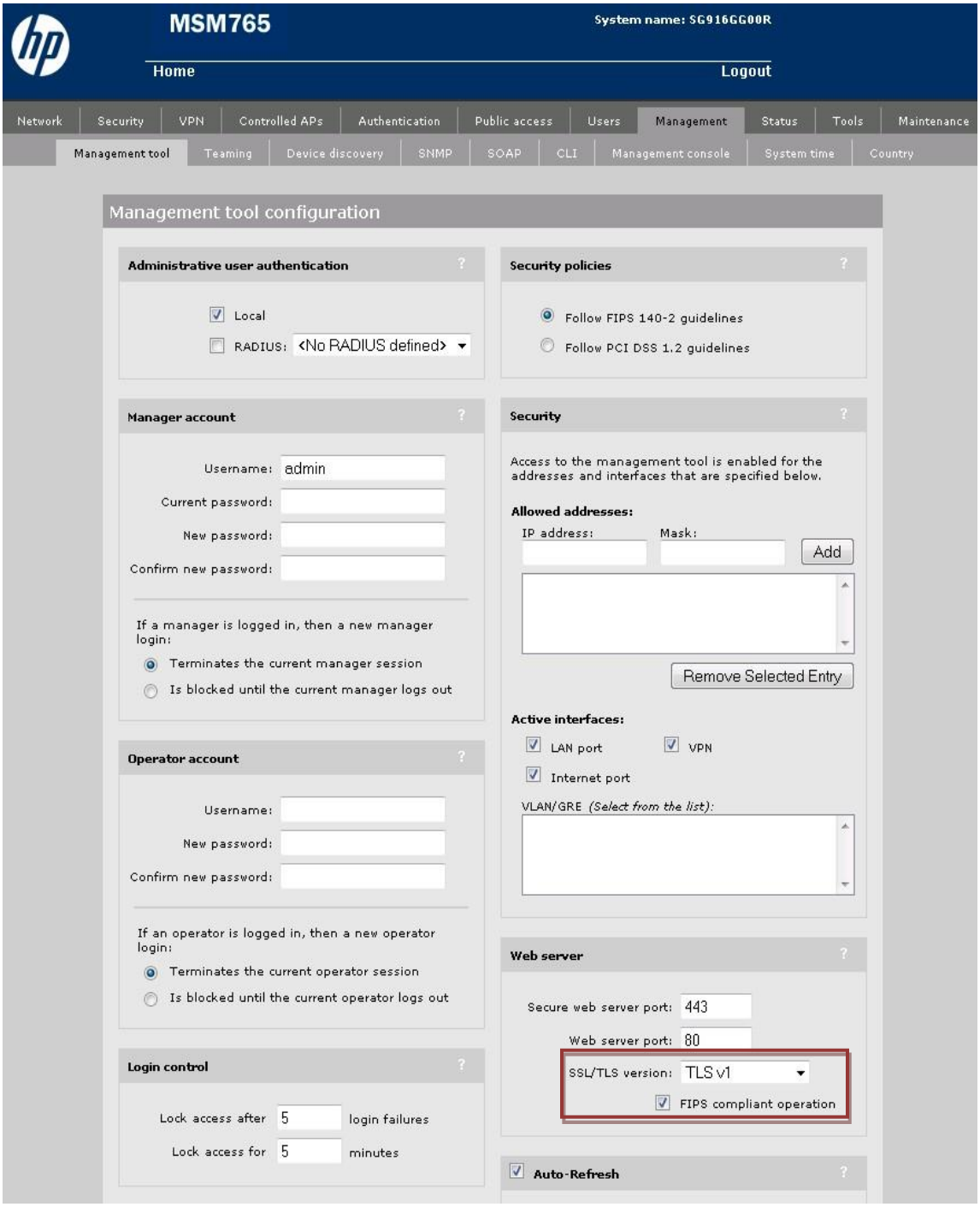
STEP 2: RESET THE CONTROLLER TO THE FACTORY DEFAULT

- Reset the controller to the factory default by going to web page “Config file management” of “Maintenance” and selecting the “Reset” button. Use the chassis CLI interface to give an address to the controller. This is done to ensure the HP MSM765zl Mobility Controller uses the default certificates which have 2048-bit RSA public keys. Operators can install their own certificates.



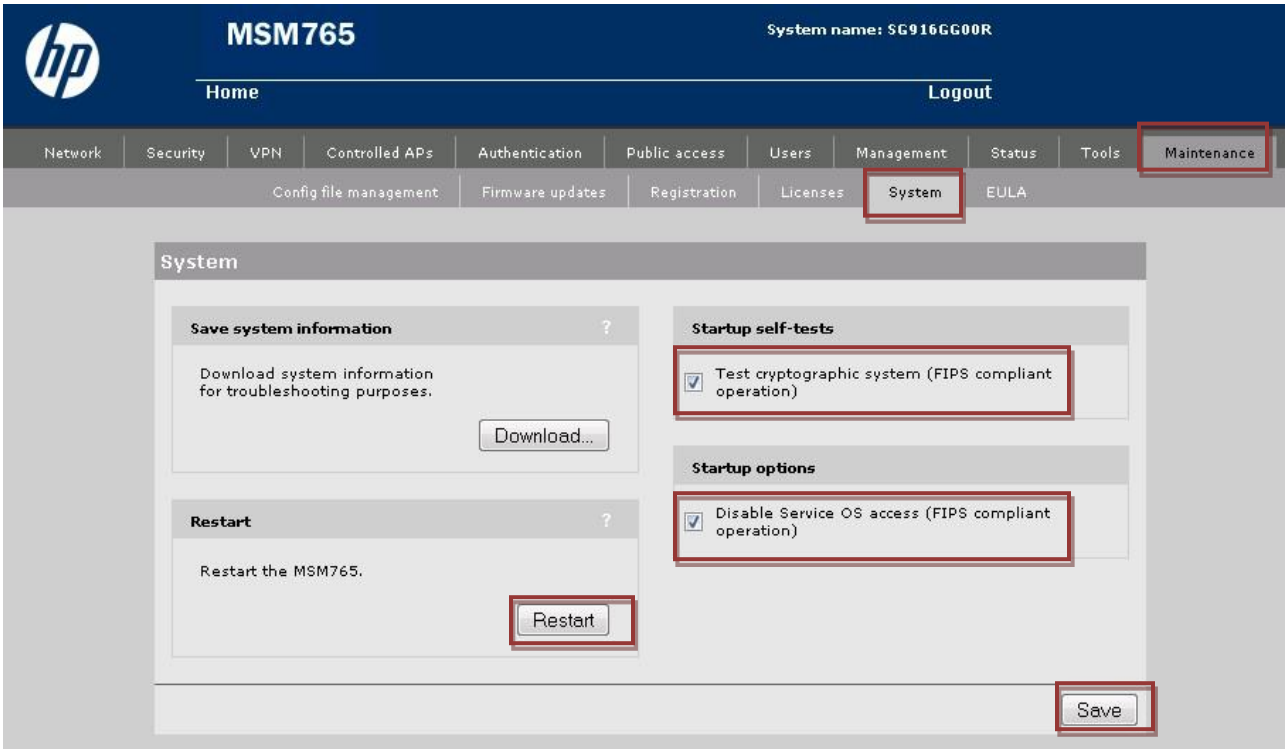
STEP 3: CONFIGURE THE MANAGEMENT TOOL

- Login using the default username and password.
- Select the “Management” tab and then select the “Management tool” tab.
- Select “TLSv1” from the drop-down list.
- Select “FIPS compliant operation”.
- Click on “Save” at the bottom of the web page.
- The Administrator will need to login again to the controller since the changes to the Management tool will force a reboot of the controller.



STEP 4: SELECTING SELF-TESTING AND DISABLING SERVICE OS

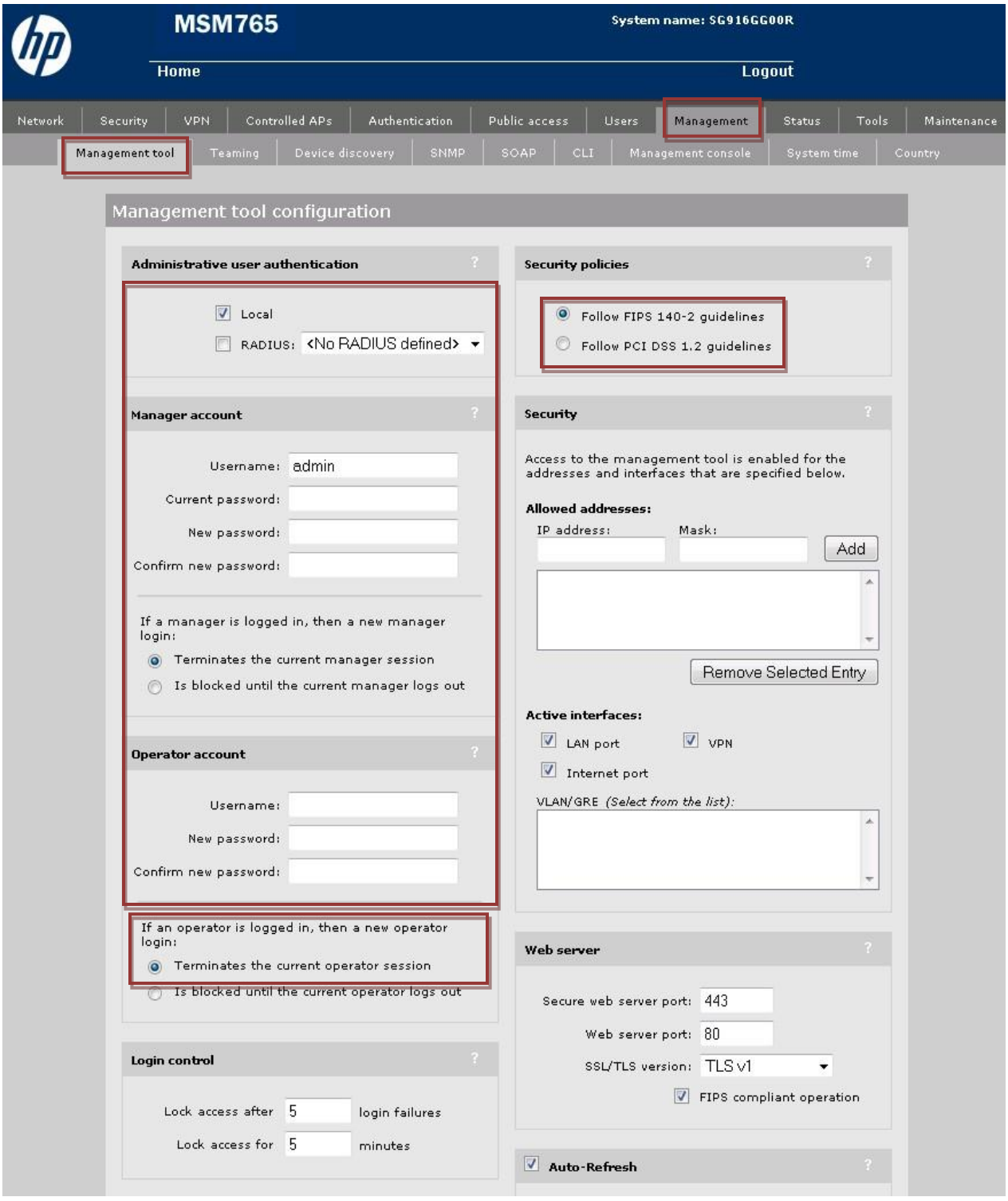
- Go to the “System” page of “Maintenance”. Note that the web page will not look the same as the shown screen shot for a teamed controller.
- Select the checkbox “Test cryptographic system (FIPS compliant operation)”.
- Select the checkbox “Disable Service OS access (FIPS compliant operation)”.
- Click on the “Save” button and then on the “Restart” button. The controller will reboot and run the power-up self-tests.



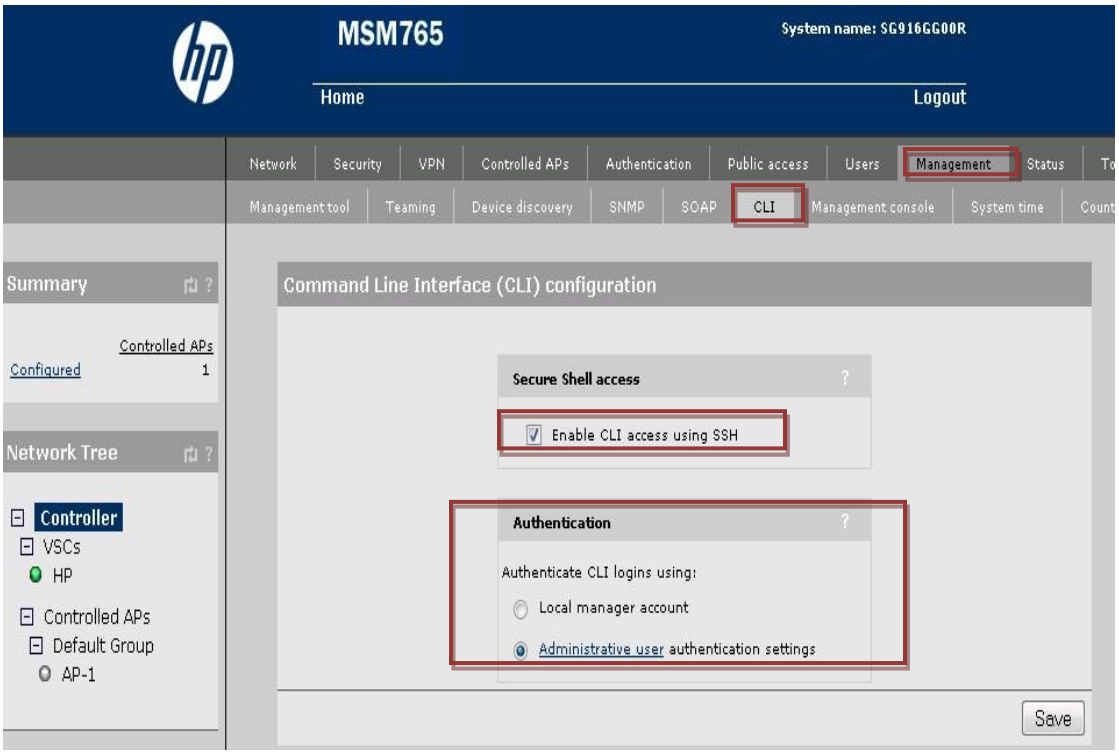
- The web and CLI (through SSH) access will use only FIPS approved algorithms.

STEP 5: AUTHENTICATION SETUP

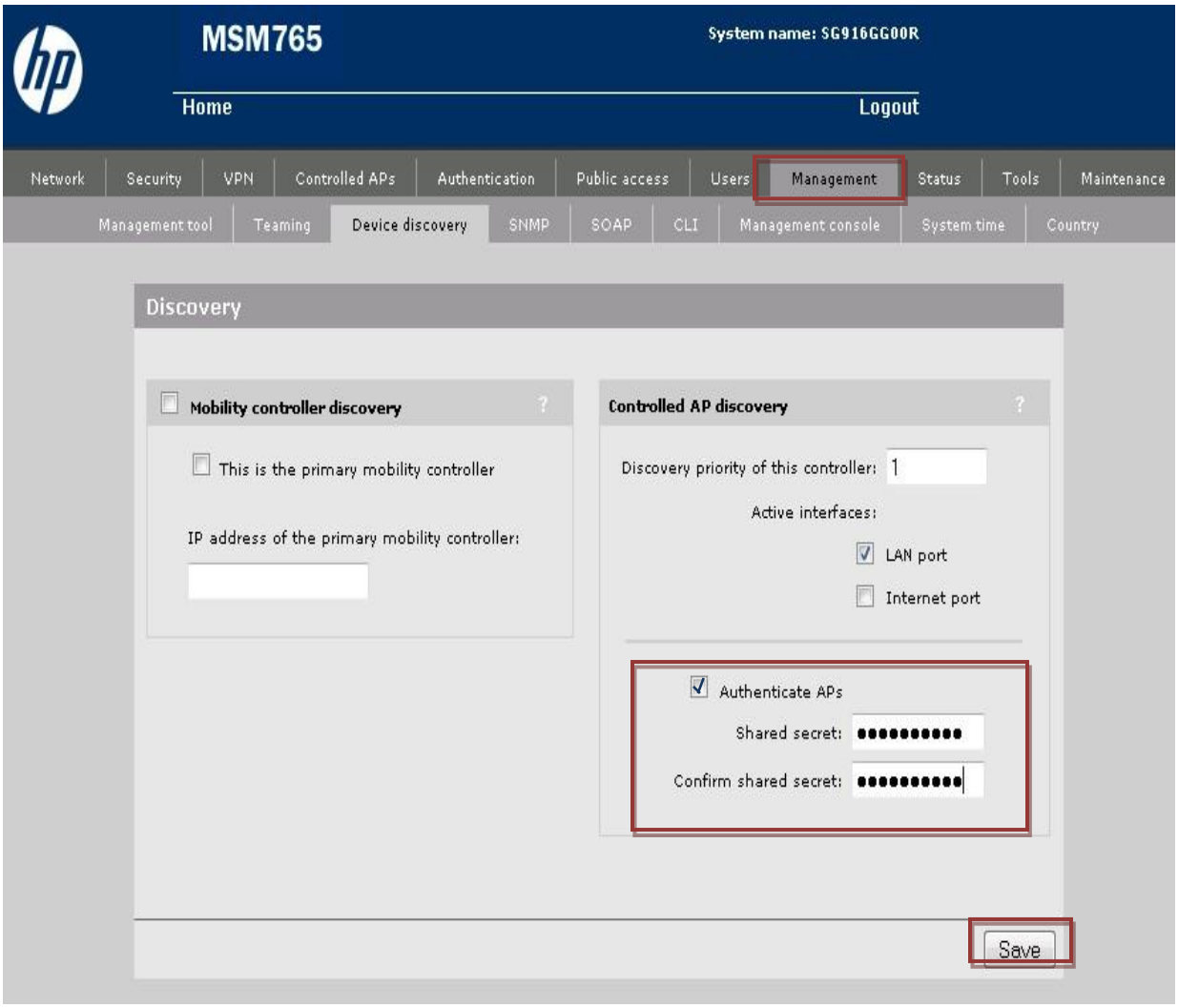
- Login with the default username (admin) and password (admin) and select the "Management tool" tab on the "Management" web page.
- Set the **Manager account** username and password.
- If desired, set a username and password for the **Operator account**.
- Make sure that the Security policy is set to "Follow FIPS 140-2 guidelines".
- In the login control, do not increase the number of failures to more than "5" or set the lock access ("Lock access for") to "0" minutes.



- CLI: If the CLI is to be used, do the following:
    - Select the “CLI” tab of the “Management” web page.
    - Select the “Enable CLI access using SSH” checkbox.
    - Either Authentication option may be used.

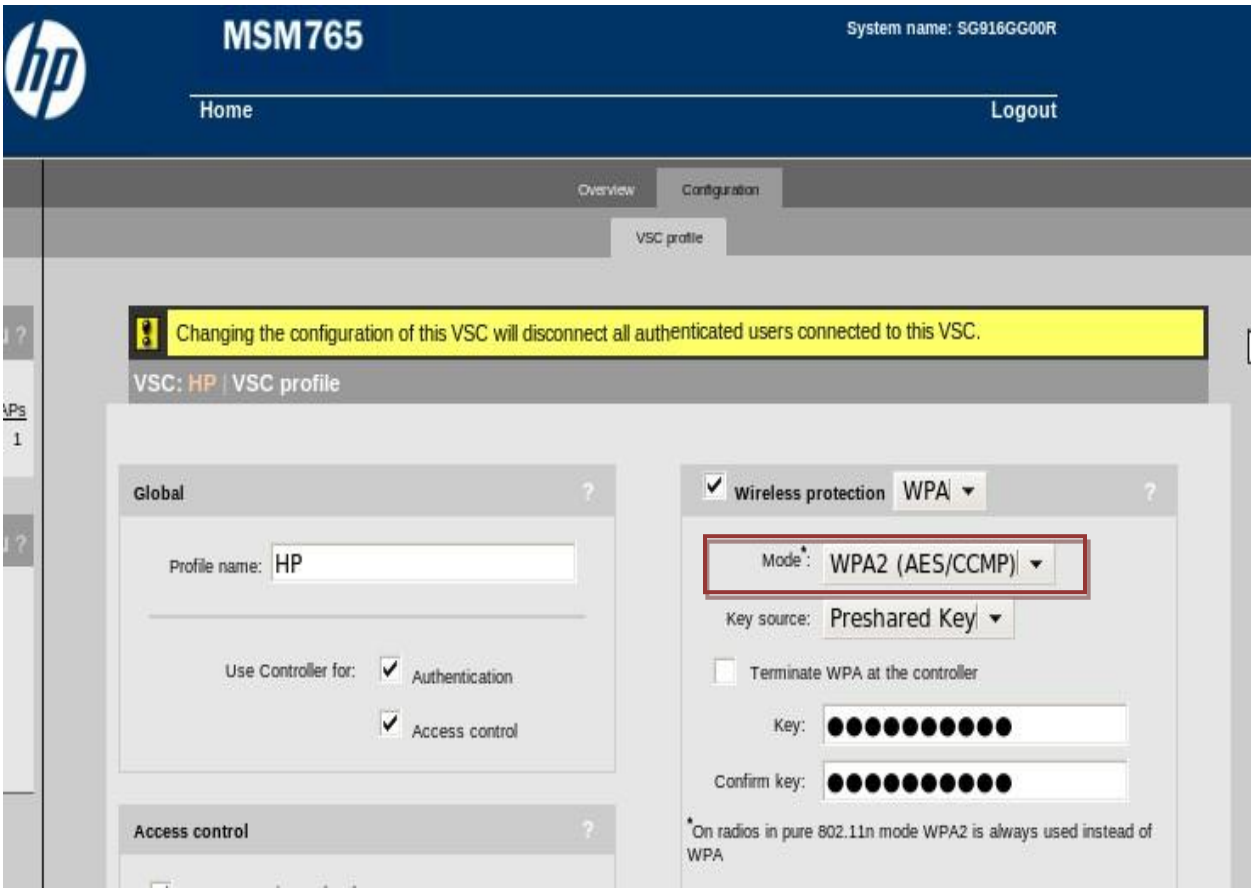


- Access Point Authentication: Select the “Device discovery” tab of the “Management” web page.
- Select the “Authenticate APs” checkbox to ensure that the Access Points authenticate to the controller.
- Enter the Shared Secret for the Access Point in the “Shared secret” and “Confirm shared secret” boxes (must be the same as on the Access Points).
- Click the “Save” button to save the setting and shared secret.

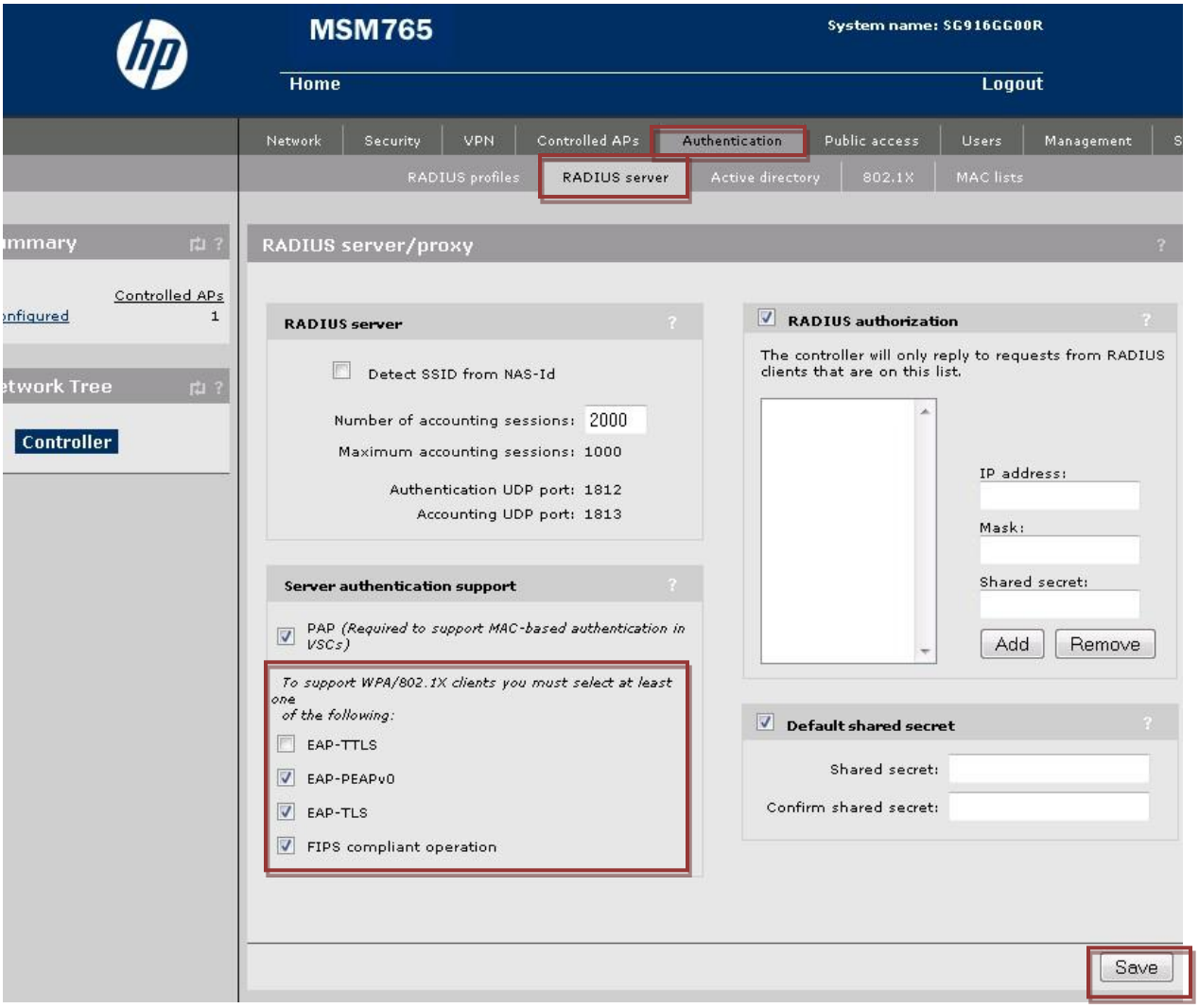


STEP 6: SET RESTRICTIONS

- Terminate WPA at the controller must NOT be used to be in the FIPS approved mode of operation. The "Terminate WPA at the controller" checkbox must not be selected.



- RADIUS EAP: Select the "RADIUS server" tab of the "Authentication" web page.
- Do not select the "EAP-TTLS" checkbox but can select the "EAP-PEAPv0" and "EAP-TLS" checkboxes.
- Select the checkbox "FIPS compliant operation" to restrict the EAP ciphersuites to the FIPS approved ones.

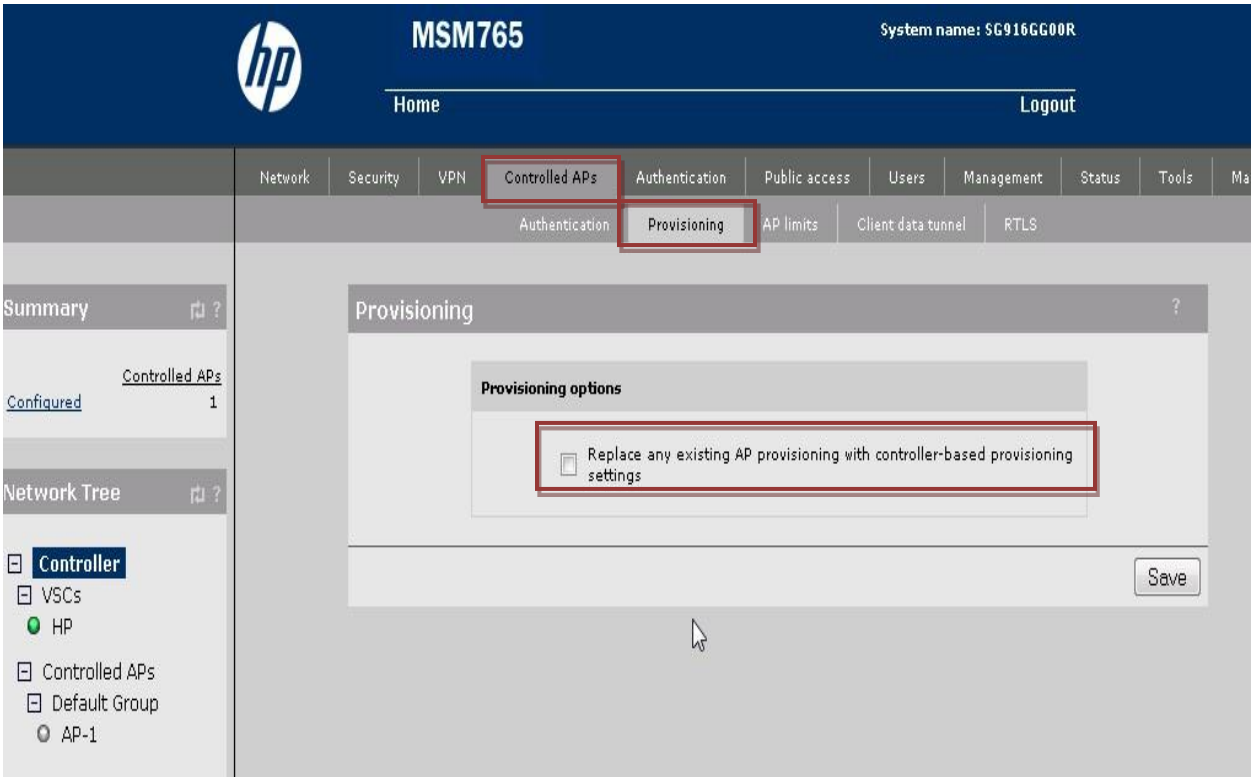


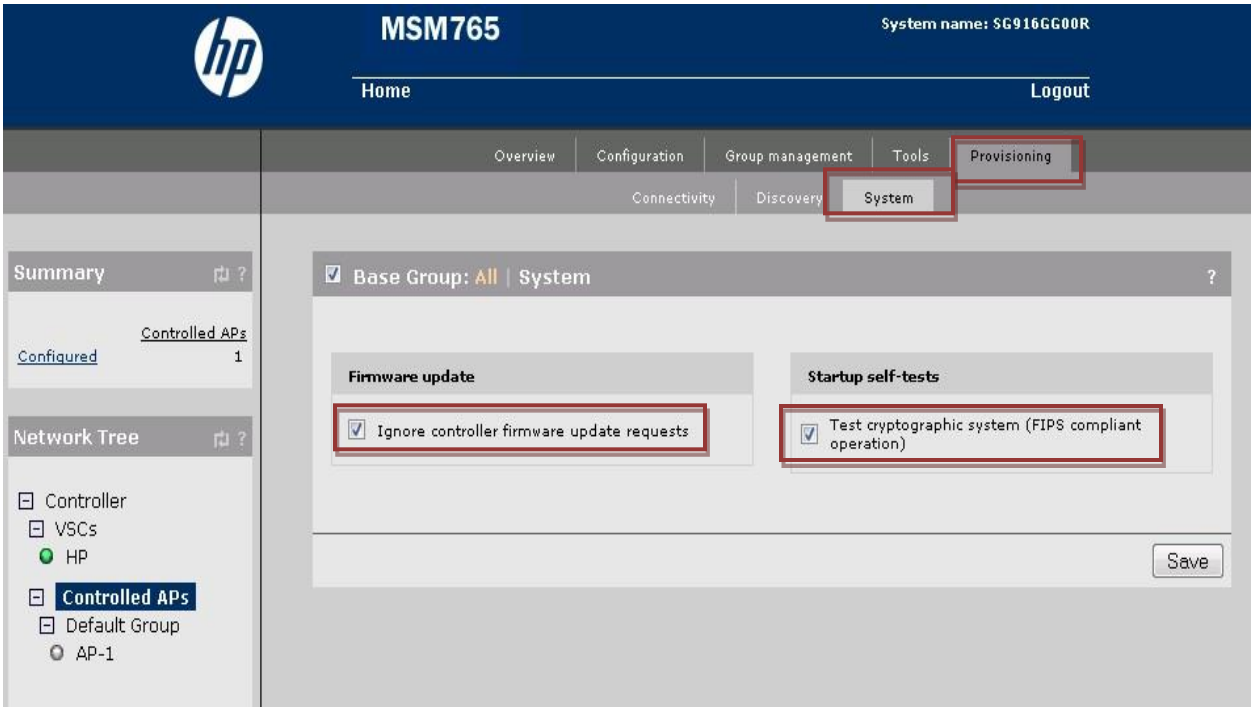
The HP MSM765zl Mobility Controller is not to be used as a generic RADIUS server.

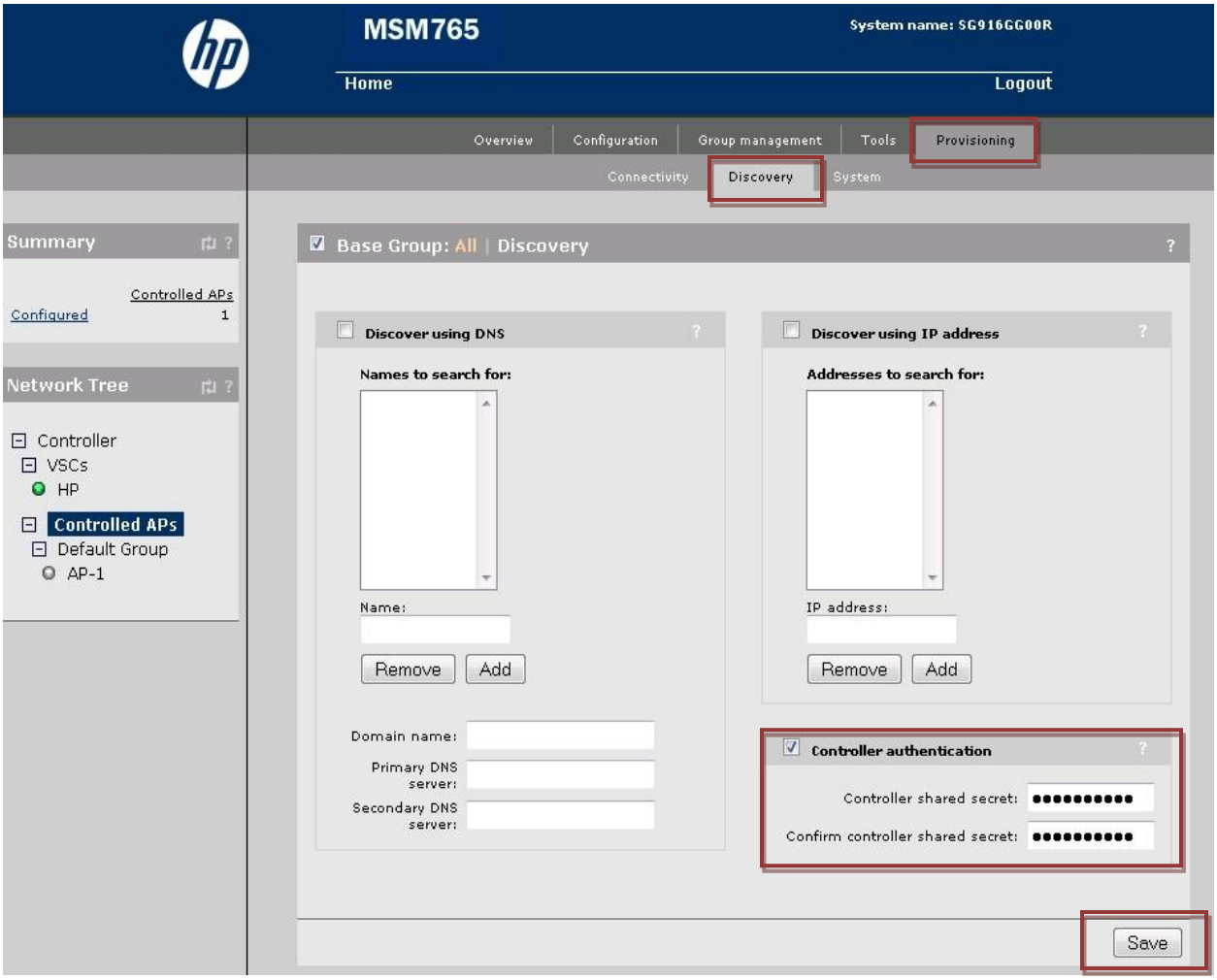
- Provisioning from the controller
- If provisioning from the controller is enabled, then the controller must NOT remove the provisioning settings that make the Access Points operate in the FIPS approved mode of operation:

    - Ignore controller firmware update requests;
    - Test cryptographic system;
    - Authentication of the controller; and
    - AES/CCMP used when provisioning a local mesh link.

- The page to enable provisioning from the controller is “Provisioning” available from the “Controlled APs” tab.

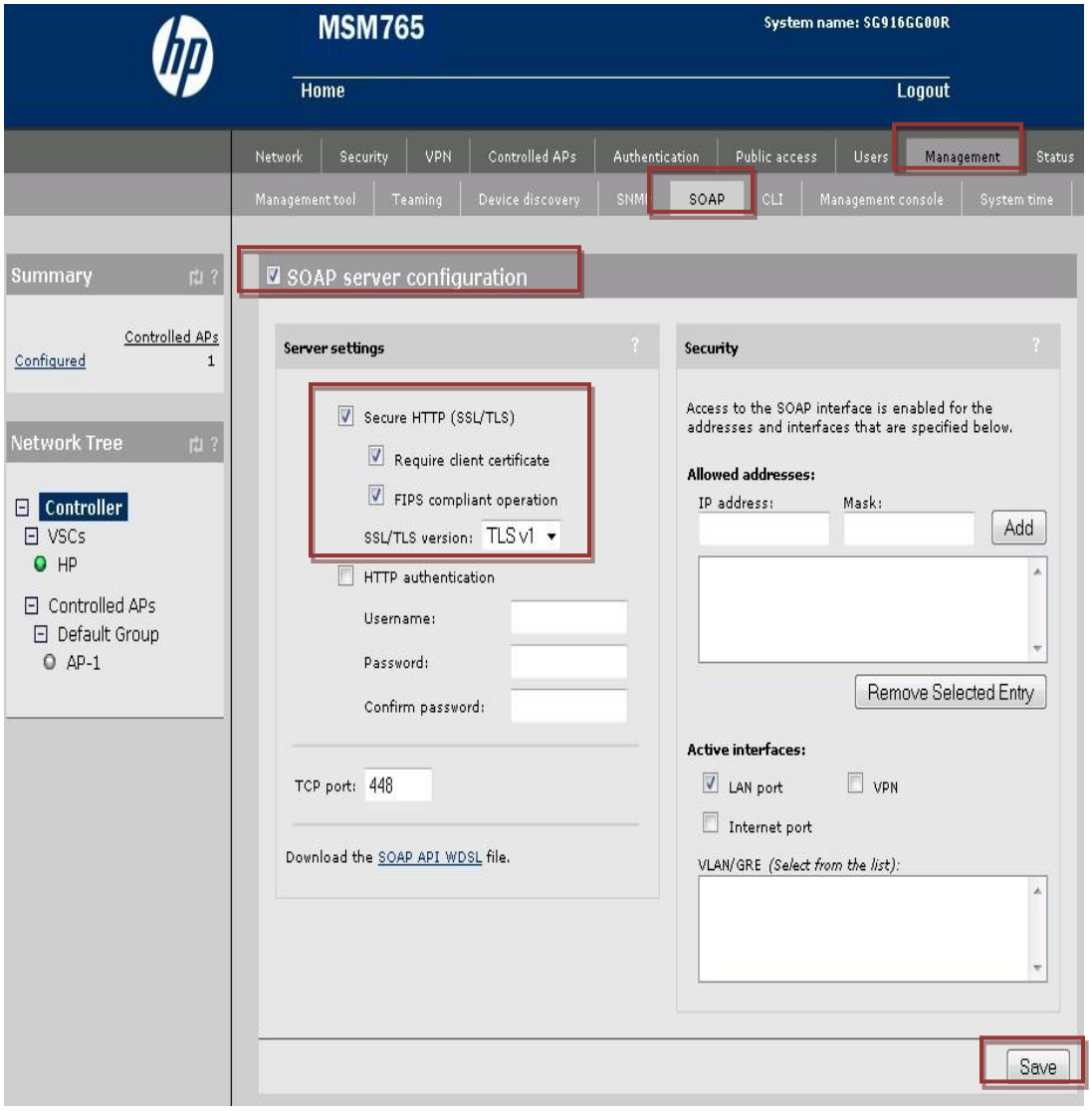




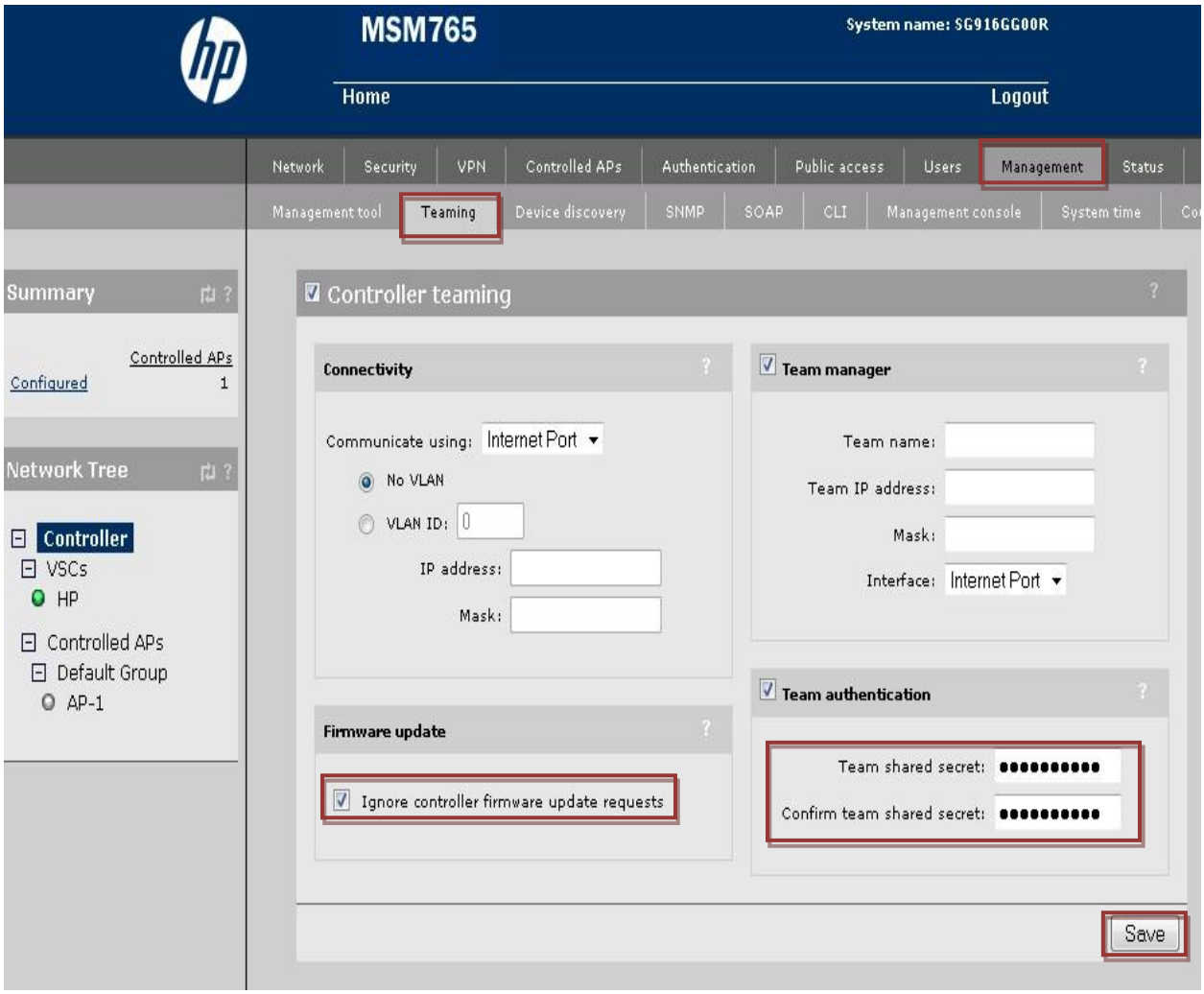


- SOAP configuration
- If the “SOAP server configuration” checkbox is selected, the following must also be done:

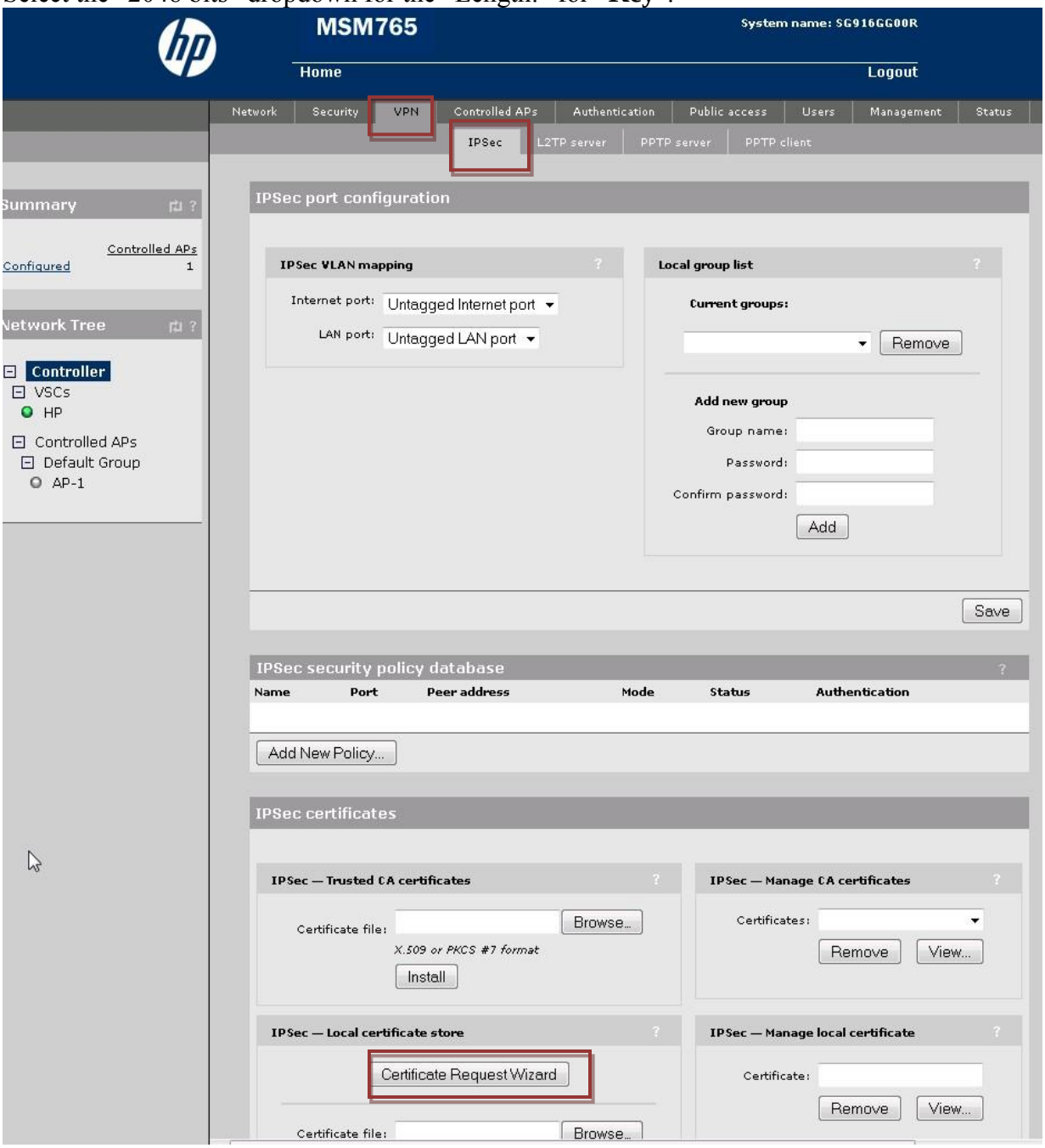
    - The “Secure HTTP (SSL/TLS)” checkbox must be selected.
    - The “Require client certificate” checkbox must be selected.
    - The “FIPS compliant operation” checkbox must be selected.
    - “TLSv1” dropdown must be selected for “SSL/TLS version”.
    - A trusted CA X.509 cert must be installed that is to be used to validate the SOAP client certificate.
    - The “Save” button must be clicked to save the settings.

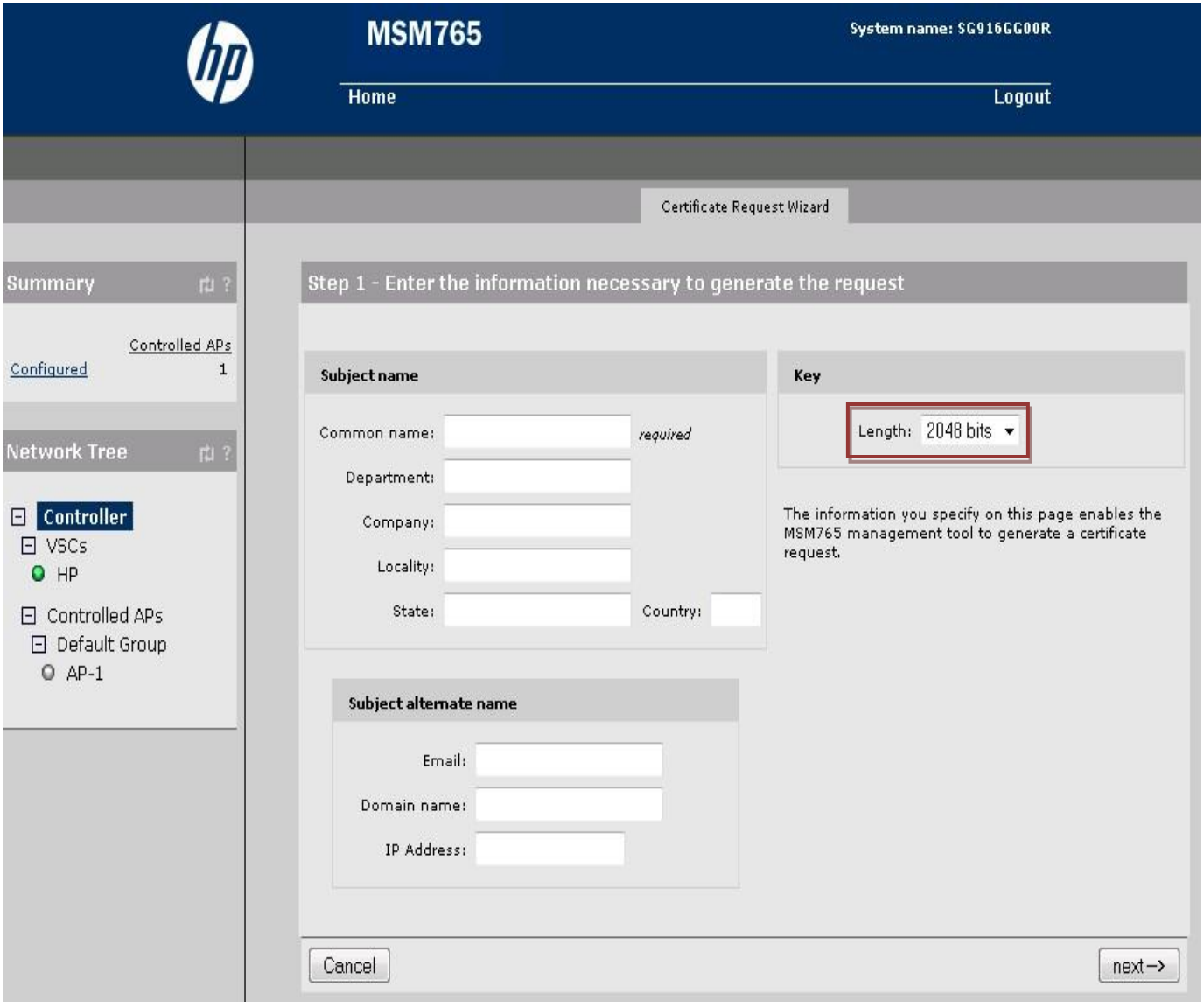


- Teaming
- If the “Controller teaming” checkbox is selected, the following must also be done:
    - The “Ignore controller firmware update requests” checkbox must be selected.
    - The “Team authentication” checkbox must be selected.
    - A team shared secret must be entered in the “Team shared secret” and “Confirm team shared secret” boxes.
    - The “Save” button must be selected to save the settings.



- Certificate Wizard
- When using the IPSec certificate request wizard, 2048-bits keys must be selected.
- The IPSec certificate request wizard is available on the “IPSec” page for the “VPN” tab.
- Click the “Certificate Request Wizard” button.
- Select the “2048 bits” dropdown for the “Length:” for “**Key**”.

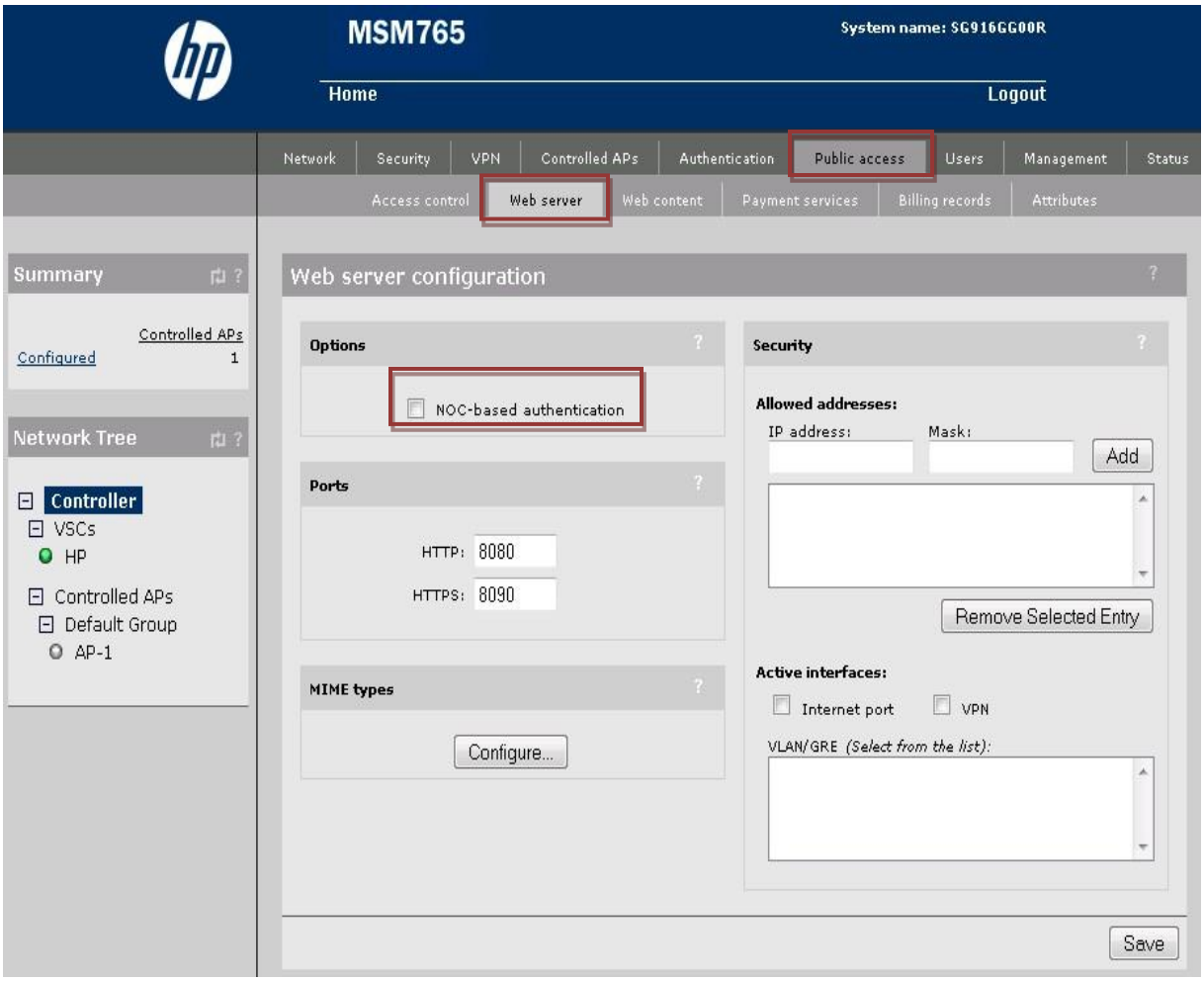




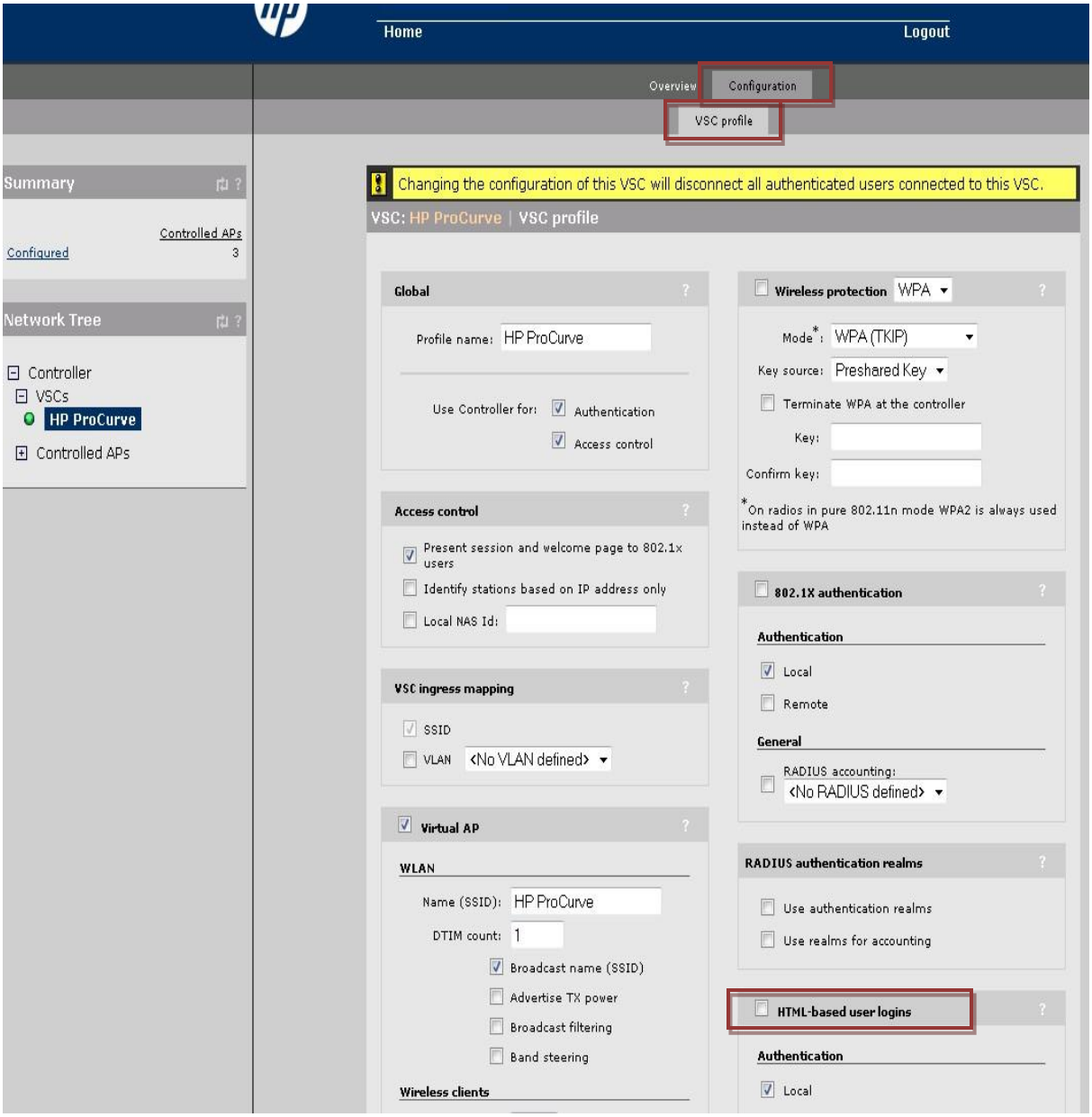
STEP 7: SERVICES THAT ARE NOT ALLOWED IN THE FIPS APPROVED MODE OF OPERATION

The following shows the services that must not be configured for the HP MSM765zl Mobility Controller to operate in the FIPS approved mode of operation.

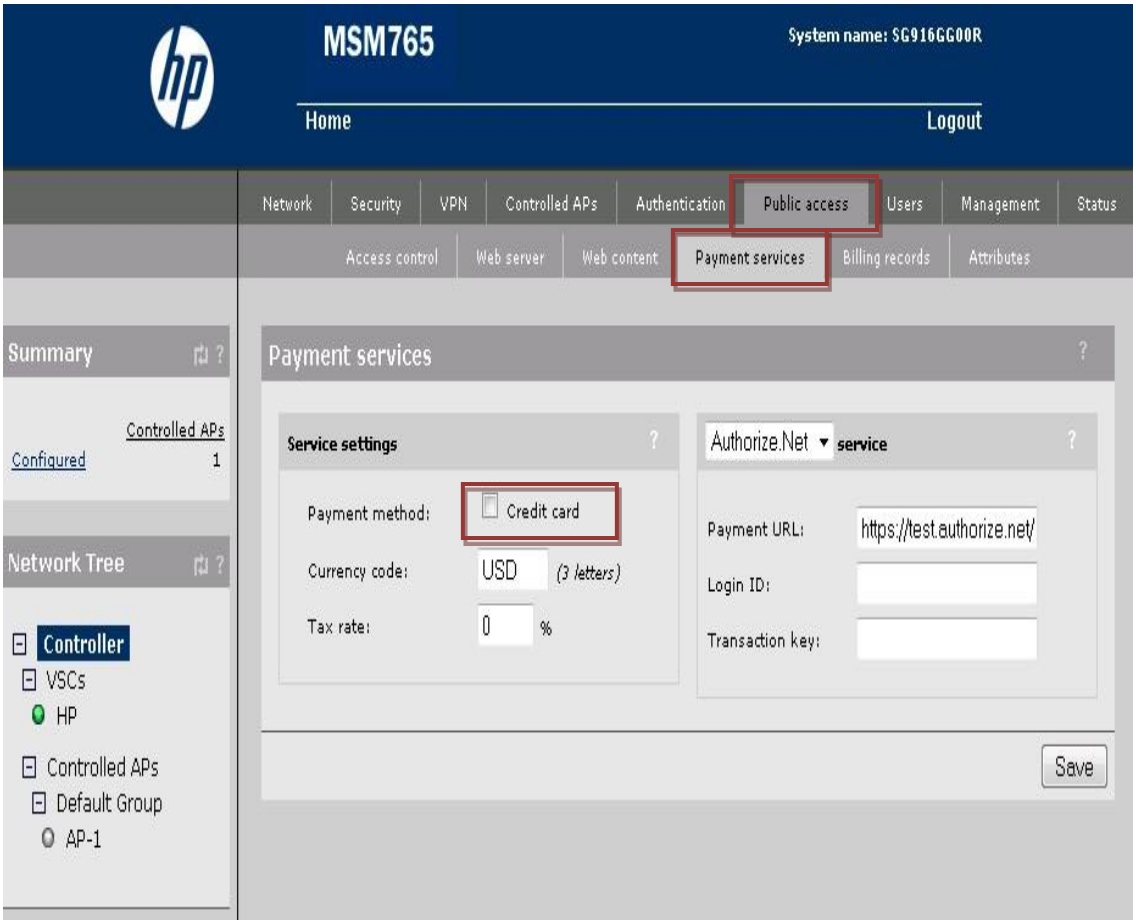
- NOC Based Authentication
- Do not check “NOC-based authentication” on the “Web server” page of the “Public Access” web page.



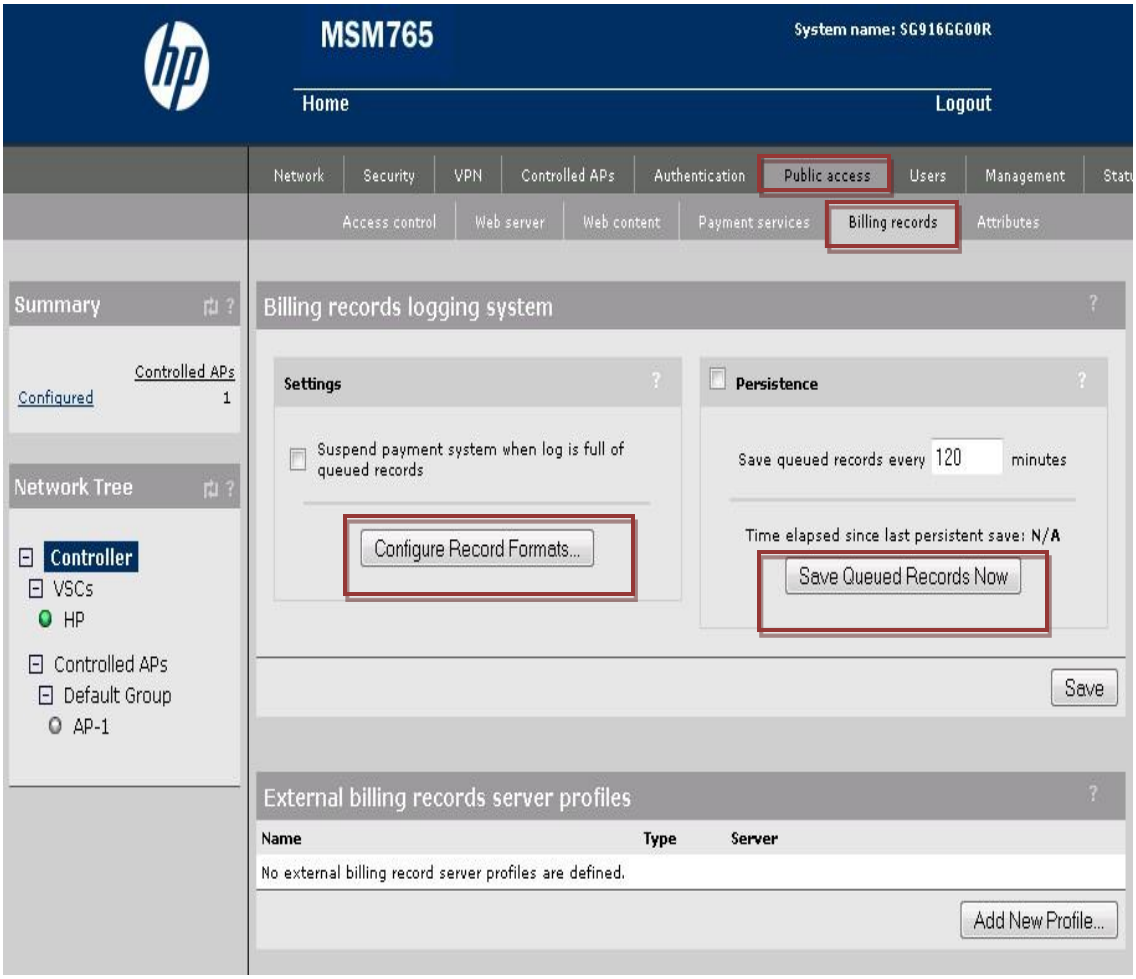
- HTML Authentication
- Do not check "**HTML-based user logins**" on the "VSC profile" page of the "Configuration" web page.

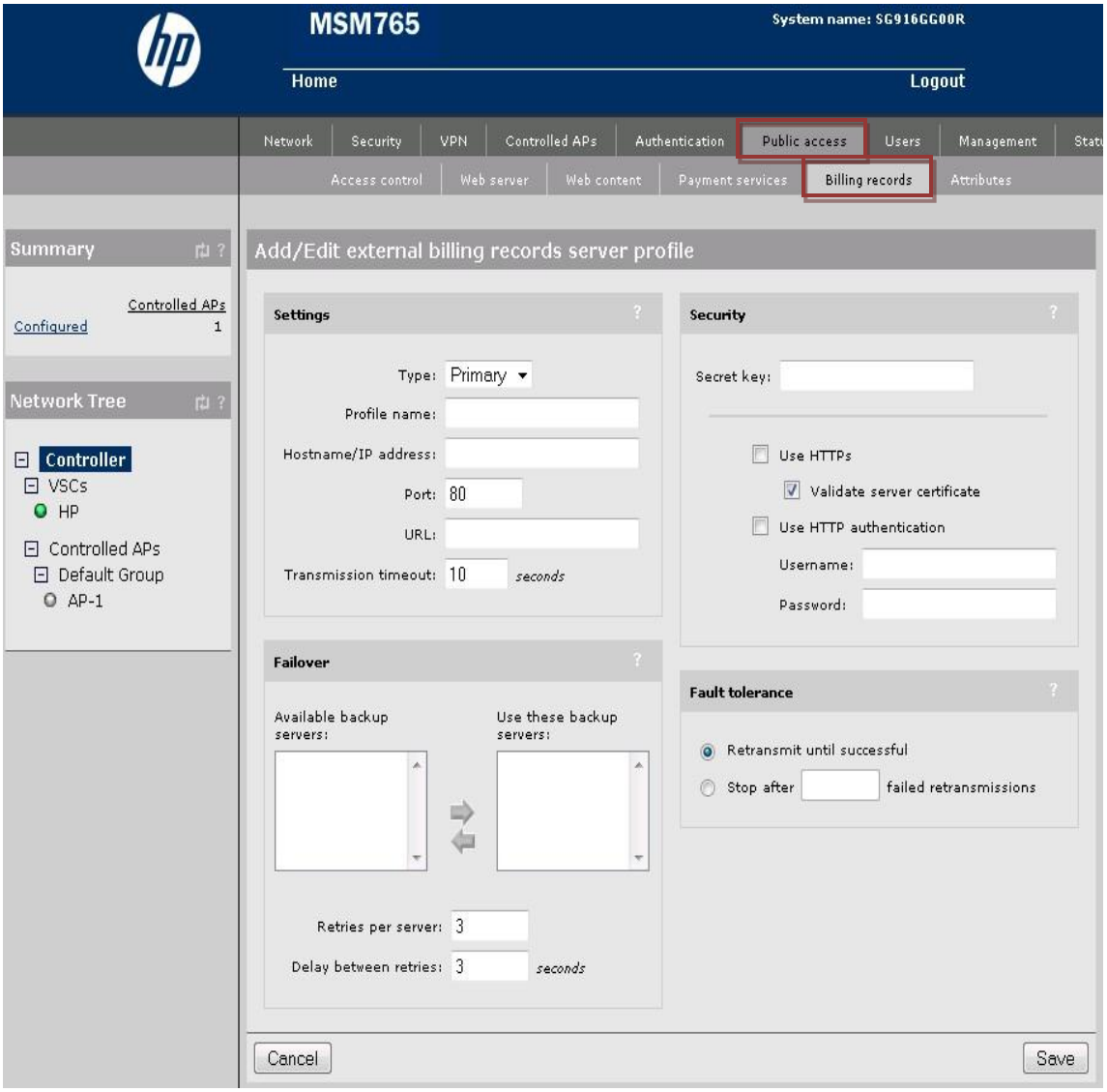


- Payment Services
- Do not check “Credit card” or enter information on the “Payment services” page of the “Public Access” web page.

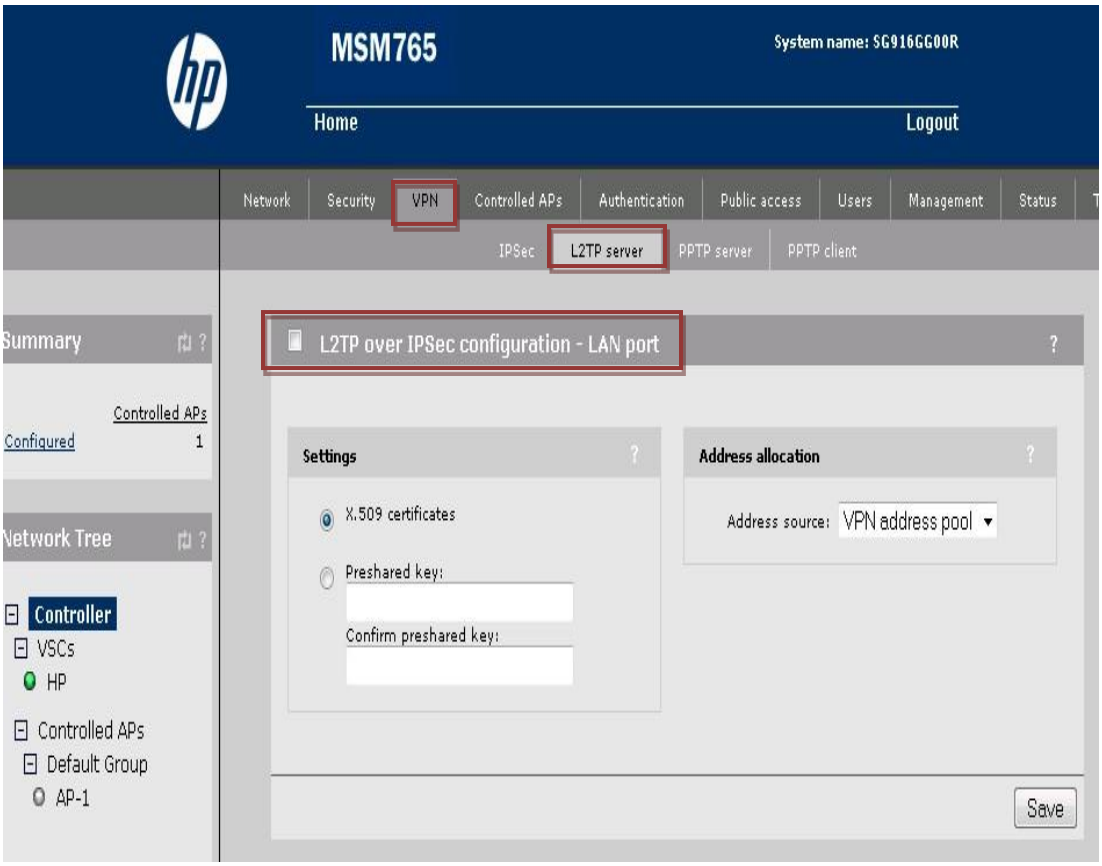


- Billing Records Logging
- Do not select any checkboxes or enter information on the “Billing records” page of the “Public Access” web page.

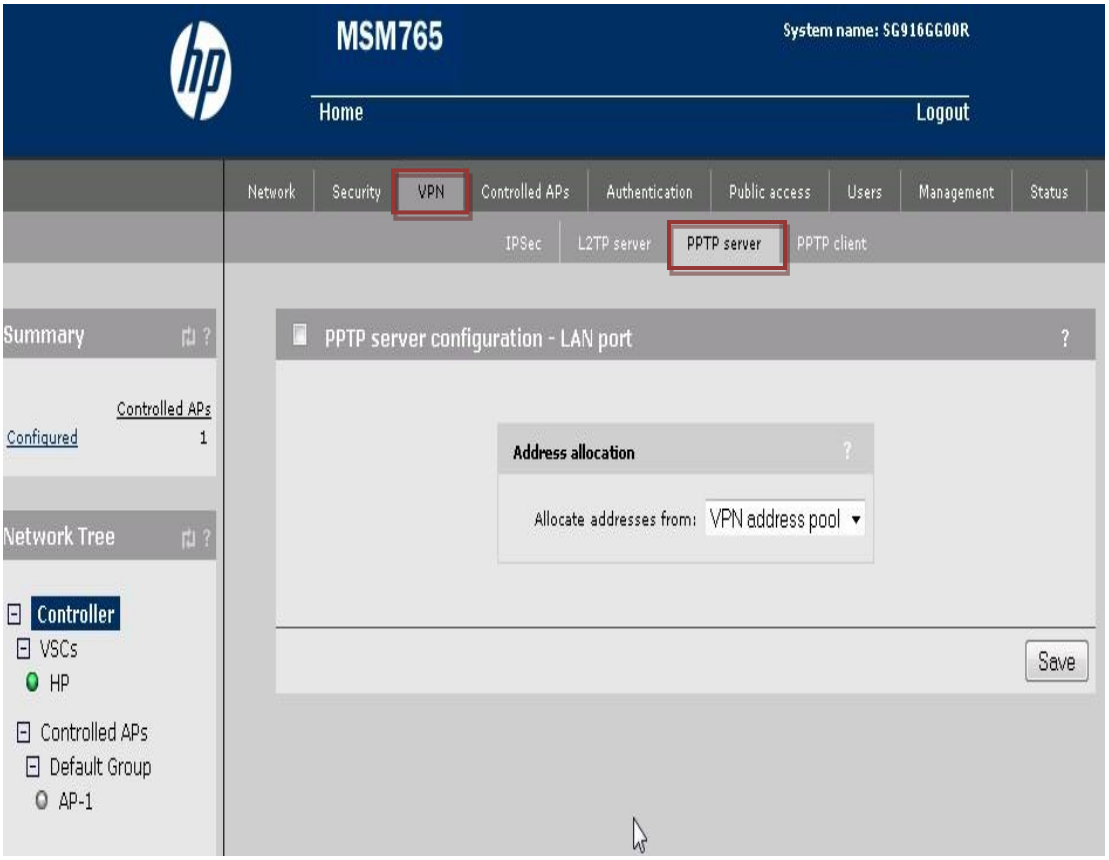




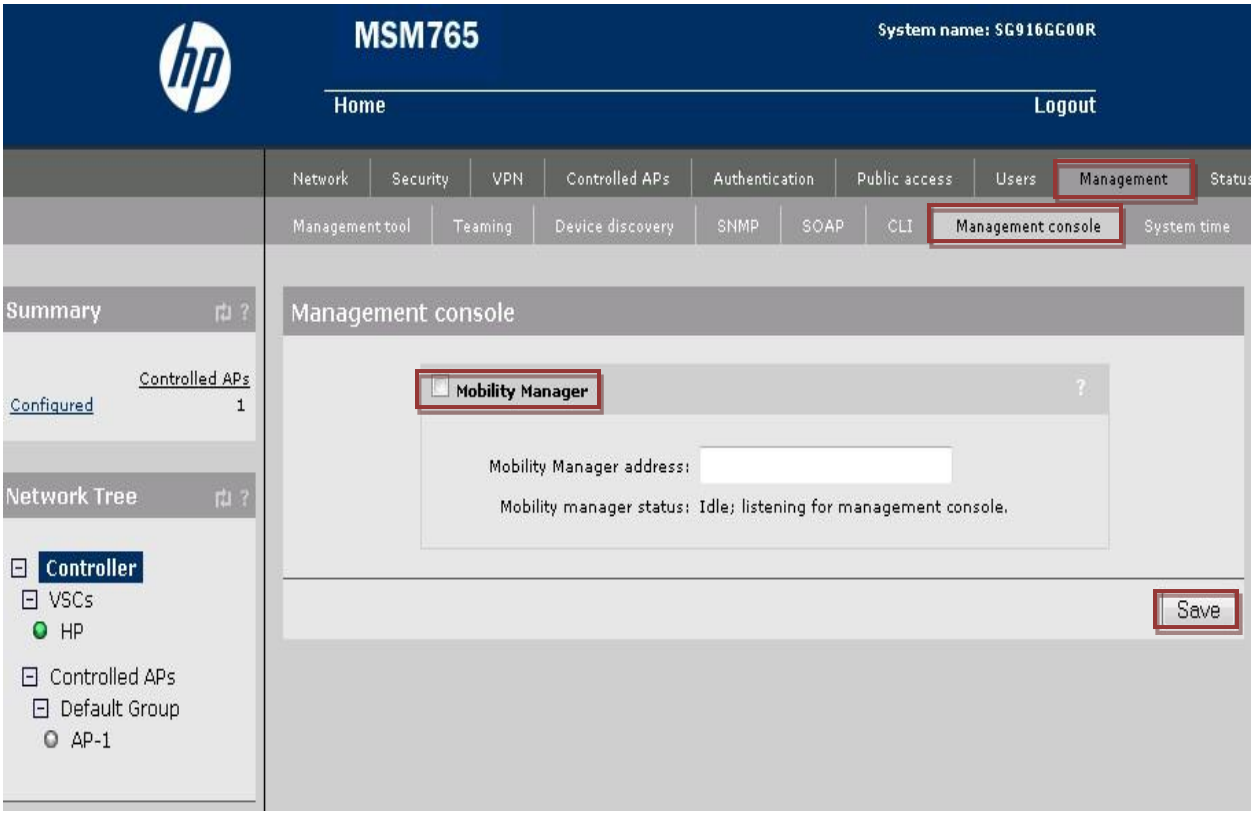
- L2TP Server
- Do not check the checkbox for “L2TP over IPSec configuration - LAN port”.



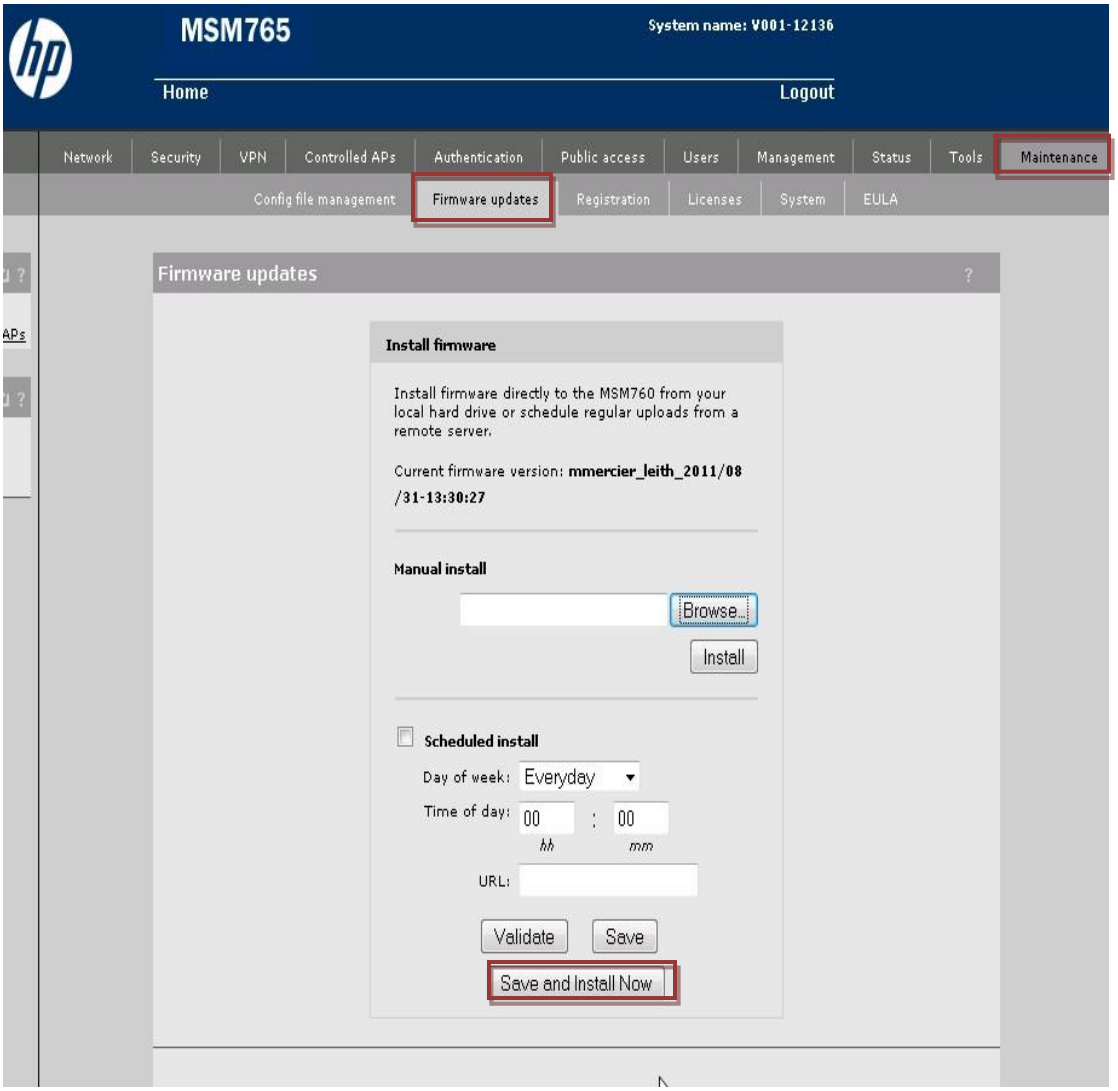
- PPTP Server
- Do not select the “PPTP server configuration – LAN port” checkbox on the “PPTP server” page of the “VPN” web page.



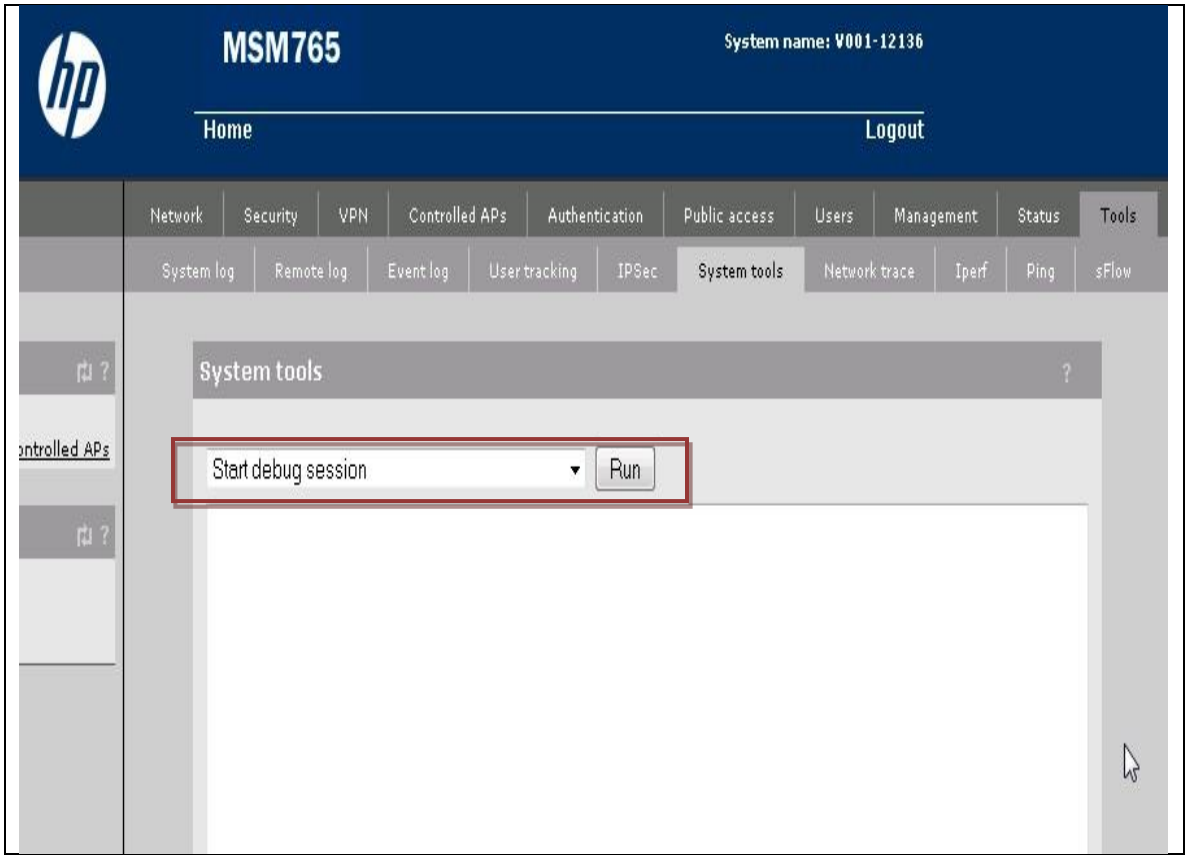
- Mobility Manager
- Uncheck the "**Mobility Manager**" checkbox on the "Management console" page of the "Management" web page.
- Click the "Save" button to save the configuration.



- Automatic Firmware Installations
- Do not check the "**Scheduled install**" checkbox on the "Firmware updates" page of the "Maintenance" web page and click the "Save" or the "Save and Install Now" buttons.



- System tool debug session
- Do not run the “Start debug session” system tool available on the “System tools” page of the “Tools” web page. It starts an SSH server that is not under control of the Crypto-Officer.



4 SECURITY RULES DERIVED FROM THE REQUIREMENTS OF FIPS PUB 140-2

4.1 FINITE STATE MODEL

The cryptographic functionality of the cryptographic modules is provided by the HP MSM765zl Mobility Controller. The finite state model for the HP MSM765zl Mobility Controller is shown and described in the *HP MSM765zl Mobility Controller Finite State Model*.

4.2 ELECTROMAGNETIC INTERFERENCE/ELECTROMAGNETIC COMPATIBILITY (EMI/EMC)

The HP MSM765zl Mobility Controller and the HP 8206 zl Switch (including Management Module, System Support Module, Fabric Modules, and line cards) were tested as meeting FCC 47 CFR Part 15, Subpart B: 1999 Class A by the Roseville Hardware Test Center which is accredited for EMI/EMC testing by the American Association for Laboratory Accreditation with laboratory number 0923-01. The HP 5406 zl Switch, the HP 5412 zl Switch, and HP 8212 zl Switch are formally declared to have similar EMI/EMC characteristics.

4.3 SELF-TESTS

4.3.1 Power-Up Self-Tests

The cryptographic modules implement the following power-up self-tests that are initiated on the application of power:

- Firmware integrity test verifying the SHA-1 hash on all executables, shared libraries, and kernel loadable modules;
- Known answer test for the AES-using, FIPS-approved deterministic random number generator specified in *NIST-Recommended Random Number Generator Based on ANSI X9.31 Appendix A.2.4 Using the 3-Key Triple DES and AES Algorithms* in firmware;
- Encryption and decryption known answer tests on the user space firmware implementation of Triple DES, with 2 and 3 keys;
- Encryption and decryption known answer tests on the kernel space firmware implementation of Triple DES, with 3 keys;
- Encryption and decryption known answer tests, with 128 bit keys, on the user and kernel space firmware implementations of AES;
- PKCS#1 v1.5, PSS, and ANSI X9.31 RSA in firmware tested with signature generation and verification known answer tests using 1024 bit keys and the hash algorithms SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512 (implementation used for TLS and SSH);
- Second implementation of PKCS#1 v1.5 RSA in firmware tested with signature generation and verification known answer tests with 1024 bit keys and using the SHA-1 hash algorithm (implementation used for IPSec);
- Known answer test on user space implementation of SHA-1 in firmware;
- Known answer test on kernel space implementation of SHA-1 in firmware;
- Known answer test on kernel space implementation of HMAC-SHA-1 in firmware; and
- Known answer test on user space implementations of HMAC-SHA-1 in firmware.

These tests can be executed on demand by rebooting the controller.

4.3.2 Conditional Self-Tests

The cryptographic modules implement the following conditional self-tests:

- Firmware load test, verification of a HMAC-SHA-1 message digest, on the entire firmware loaded on to the HP MSM765zl Mobility Controller;
- Pair-wise consistency tests on generated RSA key pairs;
- Cryptographic bypass test on peer-to-peer policies defined in the IPSec policy database (verification of the HMAC-SHA-1 hash over the table when a policy is to be added, modified, or deleted); and
- Continuous random number generator tests on the FIPS-approved ANSI X9.31 with AES deterministic random number generator and on /dev/urandom, which provides random data for the seed key and seed for the FIPS-approved PRNG.

The cryptographic modules do not support manual key entry. The two independent actions for bypass are the configuration of the IPSec security policy to include certain IP addresses and the searching of the security associations table for the IP address.

If a conditional self-test passes, the associated service will be provided. If the firmware load test fails, the firmware will not be updated. If the cryptographic bypass test fails, the error is reported and all IPSec connections are terminated. If the pair-wise consistency test fails or the continuous random number generator test fails, an error is reported.

4.4 DESIGN ASSURANCE

4.4.1 Delivery and Operation

HP tracks each shipment and is able to provide confirmation to the customer that the FIPS-validated cryptographic module has been received. The *HP MSM765zl Mobility Controller Installation and Getting Started Guide* and the *HP MSM7xx Controllers Management and Configuration Guide* describe how the user can validate the receipt of an HP MSM765zl Mobility Controller that is part of the FIPS 140-2 validated cryptographic module.

HP MSM765zl Mobility Controllers are shipped in static bags with a seal closing each bag.

4.4.2 Functional Specification

The functional specification for the HP MSM765zl Mobility Controller is contained in the *Functional Specification for the HP MSM765zl Mobility Controller* document. Functional specifications for the switches with their component modules also exist and were provided in support of the validation of the 5400/8200 zl Switch Series cryptographic modules.

4.4.3 Guidance Documents

Crypto-Officer guidance for the cryptographic module is provided in this document and in the *HP MSM765zl Mobility Controller Installation and Getting Started Guide*, the *HP MSM7xx Controllers Management and Configuration Guide*, the *HP Switch Software Management and Configuration Guide 3500 switches, 3500yl switches, 5400zl switches,6200yl switches, 6600 switches, 8200zl switches*.

User guidance for the HP MSM765zl Mobility Controller is provided in the Security Policy for the HP MSM430, HP MSM460, and HP MSM466 dual radio access points.

5 ADDITIONAL SECURITY RULES

5.1 ENFORCED SECURITY RULES

1. IPSec Security Associations are restricted to transforms Triple DES-SHA1 or AES-SHA1[1].

2. Only 128-bit AES, 256-bit AES, or 3 key Triple DES will be negotiated as an encryption algorithm for an SSH session.

5.2 SECURITY RULES NOT ENFORCED BY THE CRYPTOGRAPHIC MODULE

1. When using a RADIUS server for authentication, the link between the HP MSM765zl Mobility Controller and the RADIUS server must be protected by IPSec. An IPSec transport mode connection for the RADIUS server can be configured on the **Authentication** page within the GUI management tool. Information on how to do this is provided in the *HP MSM765zl Mobility Controller Installation and Getting Started Guide* or the *HP MSM7xx Controllers Management and Configuration Guide*.

2. Any SNMP management must be done through IPSec sessions.

3. Automatic configuration backups must be secured through IPSec.

4. Active Directory, if used, must be used over IPSec.

[1] Please see NIST Special Publication 800-131A for requirements about SHA1 (SHA-1) usage.

6 IDENTIFICATION AND AUTHENTICATION POLICY

The identification and authentication policy includes specification of all roles, the associated type of authentication, the authentication data required of each role or operator, and the corresponding strength of the authentication mechanism.

Role	Type of Authentication	Authentication Data
Basic IPSec VPN User	Role-Based	IPSec Preshared Secret
X.509 IPSec VPN User	Identity-Based	IPSec Local X.509 Certificate
IPSec VPN User (Aggressive Mode)	Identity-Based	IPSec Preshared Secret and IPSec Group Name and IPSec Group Password
SOAP Administrator	Identity-Based	SOAP X.509 Certificate
Access Point (User)	Role-Based	Shared Secret for the Access Point
Teamed Controller (Crypto-Officer)	Role-Based	Team Shared Secret
Administrator (Crypto-Officer)	Role-Based	Administrator Password

Table 5 – Roles and Required Identification and Authentication

There are no authorized physical maintenance activities for the cryptographic modules, and thus they do not support a Maintenance role.

Authentication Mechanism	Strength of Mechanism
IPSec Preshared Secret	Minimum of 8 printable ASCII characters (82 different characters); probability of guessing preshared secret: 1 in 2.04×10^{15} Maximum of 20 characters per preshared secret
IPSec Group Password	Minimum of 8 printable ASCII characters (82 different characters); probability of guessing password: 1 in 2.04×10^{15} Maximum of 20 characters per password
X.509 Certificates	2048-bit RSA keys, resulting in strength of 1 in 2^{112}

Shared Secret for the Access Point (used as key in HMAC-SHA-1 message authentication code provided to access point)	Minimum of 8 printable ASCII characters (82 different characters); probability of guessing shared secret: 1 in 2.04 X 10^{15} Maximum of 20 characters per shared secret
Team Shared Secret (used as key in HMAC-SHA-1 message authentication code provided to access point)	Minimum of 8 printable ASCII characters (82 different characters); probability of guessing shared secret: 1 in 2.04 X 10^{15} Maximum of 20 characters per shared secret
Administrator Password	Minimum of 8 printable ASCII characters (82 different characters); probability of guessing password: 1 in 2.04 X 10^{15} Maximum of 20 characters per password

Table 6 – Strengths of Authentication Mechanisms

The Administrator role, a Crypto-Officer type role, is assumed by executing the web configurator or starting an ssh session and logging in with the Administrator username and password. The Crypto-Officer role can also be assumed through a SOAP session. The cryptographic modules lock out access to it for five minutes after five invalid passwords. Therefore, for a one-time strength of 1 in 2.04 X 10^{15}, the corresponding strength for a one minute period is 1 in 4.1 X 10^{14}.

Authentication based upon RSA-signed certificates gives a much greater strength than 1 in 100,000. With the 10 Gb transceiver interface of the cryptographic modules, the authentication strength in a one minute period is greater than 2^{102}. This also applies to IPSec User Roles. The authentication strength in a one minute period is greater than 1 in 2.04 X 10^{5}.

The access point authentication occurs over the Ethernet and could be automated. The processor speed for the HP MSM765zl Mobility Controller is 2.13 GHz. Also note that the Shared Secret for the Access Point or the Team Shared Secret is used in an HMAC computation and thus the controller would have to compute an HMAC from its copy of the Shared Secret for the Access Point or the Team Shared Secret. The maximum number of instructions that the processor can execute in a minute is 1.28 X 10^{11} so, to have an authentication strength of less than 1 in 100,000 or 1 X 10^{5}, the receipt and processing of the shared secret would need to take less than seven instructions. It of course takes more than seven seconds that so the required strength of authentication in a one minute period is met. The receipt of the HMAC computed using the Shared Secret for the Access Point, the computation of the HMAC from the copy of the shared secret that the controller has, and the comparison of the computed HMAC with the received HMAC, along with the other processing needed for the authentication, takes more than seven instructions.

7 ACCESS CONTROL POLICY

7.1 OVERVIEW

Section 7 Access Control Policy discusses the access that operator X, performing service Y while in role Z, has to security-relevant data item W for every role, service, and security-relevant data item contained in the cryptographic module.

The specification is of sufficient detail to identify the cryptographic keys and other CSPs that the operator has access to while performing a service, and the type(s) of access the operator has to the parameters.

7.2 CRYPTOGRAPHIC MODULE SERVICES

7.2.1 Show Status

Purpose:	Provide operating status information for the HP MSM765zl Mobility Controller
Approved Functions:	AES, Triple DES, SHA-1, RSA, HMAC-SHA-1, PRNG
Service Inputs:	Power-On
Service Outputs:	LED Array

Status lights indicate the operational status of the HP MSM765zl Mobility Controller.

The home page of the web browser-based management tool provides a quick overview of the operational status of the HP MSM765zl Mobility Controller and provides a means of selecting more detailed status of the ports and connections.

7.2.2 Perform Power-Up Self-Tests

Purpose:	Verify that the cryptographic module is operating correctly
Approved Functions:	AES, Triple DES, SHA-1, RSA, HMAC-SHA-1, PRNG
Service Inputs:	Self-Test Command
Service Outputs:	Self-Test Result (via LED)

The success of the power-up self-tests is indicated by the Module Status LED, the first LED, being a solid green. The controller is operational.

7.2.3 Perform IPSec IKE

Purpose:	Complete the IPSec IKE Exchange in preparation for ESP data transfer
Approved Functions:	RSA Signature Verification, FIPS-Approved Pseudo-Random Number Generation
Allowed Function:	Diffie-Hellman Key Establishment
Service Inputs:	IKE Inputs
Service Outputs:	IKE Outputs

7.2.4 Perform IPSec ESP Transfers

Purpose:	Transfer authentication data and SNMP MIBs securely using the IPSec Encapsulating Security Payload packets
Approved Functions:	AES, Triple DES, SHA-1, HMAC-SHA-1
Service Inputs:	Packet to be Processed
Service Outputs:	Processed Packet

The packet to be processed may be an outgoing plaintext packet that is to be converted into an IPSec packet before transmission or an incoming IPSec packet that is to be converted into a plaintext packet.

7.2.5 Perform Plaintext Data Transfer

Purpose:	Transfer authentication data and SNMP MIBs in plaintext; bypass service
Approved Functions:	HMAC-SHA-1
Service Inputs:	Packet
Service Outputs:	Unprocessed Packet

7.2.6 Access Point Management

Purpose:	Configuration of HP MSM4xx Access Points
Approved Functions:	RSA Key Generation and Signature Verification, Diffie-Hellman Key Agreement, AES in CBC mode, HMAC-SHA-1
Service Inputs:	Configuration Information
Service Outputs:	Indicator of Success or Failure of Operation

7.2.7 Controller Teaming

Purpose:	Teaming of the Controllers to Manage Access Points
Approved Functions:	RSA Key Generation and Signature Verification, Diffie-Hellman Key Agreement, AES in CBC mode, HMAC-SHA-1
Service Inputs:	Configuration Information
Service Outputs:	Indicator of Success or Failure of Operation

7.2.8 Management of HP MSM765zl Mobility Controller through TLS

Purpose:	Management of HP MSM765zl Mobility Controller through Web
Approved Functions:	RSA Key Generation and Signature Verification, Diffie-Hellman Key Agreement, AES in CBC mode, Triple DES in CBC mode, HMAC-SHA-1
Service Inputs:	Configuration Information
Service Outputs:	Indicator of Success or Failure of Operation

7.2.9 Management of HP MSM765zl Mobility Controller through SSH

Purpose:	Management of HP MSM765zl Mobility Controller through Console
Approved Functions:	RSA Signature Verification, Diffie-Hellman Key Agreement, AES in CBC mode, Triple DES in CBC mode
Service Inputs:	Configuration Information
Service Outputs:	Indicator of Success or Failure of Operation

7.2.10 Management of HP MSM765zl Mobility Controller through SOAP

Purpose:	Management of HP MSM765zl Mobility Controller through Web
Approved Functions:	RSA Key Generation and Signature Verification, Diffie-Hellman Key Agreement, AES in CBC mode, Triple DES in CBC mode, HMAC-SHA-1
Service Inputs:	Configuration Information
Service Outputs:	Indicator of Success or Failure of Operation

7.2.11 Firmware Load

Purpose:	Upgrade Firmware
Approved Functions:	HMAC-SHA-1, AES
Service Inputs:	New Firmware to be loaded on the HP MSM765zl Mobility Controller
Service Outputs:	New Firmware loaded on the HP MSM765zl Mobility Controller

7.2.12 Configuration File Export

Purpose:	Export Configuration File for Backup through TLS Session or SSH
Approved Function:	RSA Key Generation and Signature Verification, Diffie-Hellman Key Agreement, AES in CBC mode, Triple DES in CBC mode, HMAC-SHA-1
Service Inputs:	Backup Selected
Service Outputs:	Encrypted Configuration File with Encrypted Preshared Secrets, Passwords, Certificates, and Local RSA Private Key

7.2.13 Plaintext Key and CSP Zeroization

Purpose:	Zeroize Plaintext Cryptographic Keys and CSPs
Approved Function:	Zeroization
Service Inputs:	Request to Reset to Factory Default through web configurator
Service Outputs:	Factory Default Reset, Flash Memory Zeroized

7.3 ROLES, SERVICES, AND ACCESSES

7.3.1 Anonymous Services

The following services are provided to users without requiring them to assume an authorized role.

Service	Description	Security Considerations
Perform Power-Up Self-Tests	The initial power-up self-tests of the cryptographic module do not require the operator to assume a role. It only requires the application of power.	The initial power-up self-tests do not use operational keys or CSPs and therefore do not affect the security of the cryptographic module.

Table 7 – Anonymous Services

7.3.2 Role-Based Services

This section discusses, for each role, the services an operator is authorized to perform within that role, and for each service within each role, the type(s) of access to the cryptographic keys and CSPs.

Role	Authorized Services
IPSec VPN User (independent of authorization type)	Perform IPSec IKE Perform IPSec ESP Transfers Perform Plaintext Data Transfer
Access Point (User)	Access Point Management
Teamed Controller (Crypto-Officer)	Controller Teaming
SOAP Administrator (Crypto-Officer)	Management of HP MSM765zl Mobility Controller through SOAP
Administrator (Crypto-Officer)	Perform Power-Up Self-Tests (Command) Show Status Management of HP MSM765zl Mobility Controller through TLS Management of HP MSM765zl Mobility Controller through SSH Firmware Load Configuration File Export Plaintext Key and CSP Zeroization

Table 8 – Services Authorized for Roles

7.4 NON-FIPS APPROVED SERVICES

The cryptographic modules also provide the following services that are not allowed in the FIPS approved mode of operation:

- NOC-based authentication
  An HTTP interface where an external server can tell us if a given user is authorized for access;

- Payment services
  The acquiring of credit card or PayPal information;

- Billing records logging;

- L2TP services;

- PPTP services;

- Mobility manager services
  Provided through a management console that uses a TLS tunnel to transfer status and configuration information to the controller;

- Automatic firmware installation
  Provision for the automatic update of the firmware of the controller; not allowed in FIPS mode because it cannot be verified that the automatically loaded firmware has been FIPS-validated; and

- System debug tool.

7.5 SECURITY DATA

7.5.1 General

Security data comprises all cryptographic keys and CSPs employed by the cryptographic module, including secret, private, and public cryptographic keys (both plaintext and encrypted), authentication data such as passwords or PINs, and other security-relevant information (e.g., audited events and audit data).

7.5.2 Cryptographic Keys

AES Secret Keys
Triple DES Secret Keys
HMAC Secret Keys
RSA Public and Private Keys
PRNG Seed Key
Diffie-Hellman Public and Private Keys

RSA public keys in X.509 certificates are stored by the cryptographic module.

RSA public keys and Diffie-Hellman public keys are not considered to be critical security parameters.

7.5.3 Critical Security Parameters

IPSec Preshared Secret
Shared Secret for the Access Point
Team Shared Secret
Administrator Password
IPSec Group Password
PRNG Seed

7.5.4 Cryptographic Key Management

Cryptographic Key or CSP	Key Length	Key Strength	FIPS Approved Establishment Mechanism	State within Module
IPSec Local X.509 Certificates RSA Public Keys (not CSPs)	2048 bits	112 bits	Internally-generated with ANSI X9.31 RSA Key Generation or Externally-generated and EE/ED encrypted with TLS Session Key or SSH Session Key (in PKCS #12 file with IPSec RSA Private Key)	Plaintext in HDD
IPSec RSA Private Keys (mates of IPSec Local X.509 Certificates RSA Public Keys)	2048 bits	112 bits	Internally-generated with ANSI X9.31 RSA Key Generation or Externally-generated and EE/ED encrypted with TLS Session Key or SSH Session Key (in PKCS #12 file with IPSec Local X.509 Certificate)	Plaintext in HDD
IPSec CA X.509 Certificate RSA Public Key (not a CSP)	2048 bits	112 bits	Internally-generated with ANSI X9.31 RSA Key Generation or Externally-generated and EE/ED encrypted with TLS Session Key or SSH Session Key (in PKCS #12 file with IPSec CA RSA Private Key)	Plaintext in HDD

IPSec CA RSA Private Key (mate of IPSec CA X.509 Certificate RSA Public Key)	2048 bits	112 bits	Internally-generated with ANSI X9.31 RSA Key Generation or Externally-generated and EE/ED encrypted with TLS Session Key or SSH Session Key (in PKCS #12 file with IPSec CA X.509 Certificate)	Plaintext in HDD
SOAP X.509 Certificates RSA Public Keys (not CSPs)	1024 bits 2048 bits	80 bits 112 bits	Externally-generated; included with firmware or Externally-generated and EE/ED encrypted with TLS Session Key or SSH Session Key (in PKCS #12 file with SOAP RSA Private Key)	Plaintext in HDD
SOAP RSA Private Keys (mates of SOAP X.509 Certificates RSA Public Keys)	1024 bits 2048 bits	80 bits 112 bits	Externally-generated; included with firmware or Externally-generated and EE/ED encrypted with TLS Session Key or SSH Session Key (in PKCS #12 file with SOAP X.509 Certificate)	Plaintext in HDD

Web Server X.509 Certificates RSA Public Keys (not CSPs)	2048 bits	112 bits	Externally generated; part of new firmware or Externally-generated and EE/ED encrypted with TLS Session Key or SSH Session Key (in PKCS #12 file with Web Server RSA Private Key)	Plaintext in HDD
Web Server RSA Private Keys (mates of Web Server X.509 Certificates RSA Public Keys)	2048 bits	112 bits	Externally generated; part of new firmware or Externally-generated and EE/ED encrypted with TLS Session Key or SSH Session Key (in PKCS #12 file with Web Server X.509 Certificate)	Plaintext in HDD
RADIUS EAP X.509 Certificates RSA Public Keys (not CSPs)	1024 bits 2048 bits	80 bits 112 bits	Externally-generated; included with firmware or Externally-generated and EE/ED encrypted with TLS Session Key or SSH Session Key (in PKCS #12 file with RADIUS EAP RSA Private Key)	Plaintext in HDD
RADIUS EAP RSA Private Keys (mates of RADIUS EAP X.509 Certificates RSA Public Keys)	1024 bits 2048 bits	80 bits 112 bits	Externally-generated; included with firmware or Externally-generated and EE/ED encrypted with TLS Session Key or SSH Session Key (in PKCS #12 file with RADIUS EAP X.509 Certificate)	Plaintext in HDD

CA X.509 Certificates RSA Public Keys (not CSPs)	2048 bits	112 bits	Externally-generated; included with firmware or Externally-generated and EE/ED encrypted with TLS Session Key or SSH Session Key	Plaintext in HDD
Controller X.509 Certificate RSA Public Key (not a CSP)	2048 bits	112 bits	Internally-generated with ANSI X9.31 RSA Key Generation; ED	Plaintext in HDD
Controller RSA Private Key (mate of Controller X.509 Certificate RSA Public Key)	2048 bits	112 bits	Internally-generated with ANSI X9.31 RSA Key Generation	Plaintext in HDD
Access Points X.509 Certificates RSA Public Keys (not CSPs)	2048 bits	112 bits	EE/ED	Plaintext in HDD
Slave Controllers X.509 Certificates RSA Public Keys (not CSPs)	2048 bits	112 bits	EE/ED	Plaintext in HDD
Diffie-Hellman Private Keys	1024 or 1536 bits	80 or 96 bits	Internally-generated with ANSI X9.31 PRNG	Ephemeral in SDRAM
Diffie-Hellman Public Keys (not CSPs)	1024 or 1536 bits	80 or 96 bits	Internally-generated with ANSI X9.31 PRNG; EE/ED to and from controller	Ephemeral in SDRAM
TLS Session Keys	168-bit Triple DES key or 128 or 256 bit AES key	112 bits for 168-bit Triple DES key; 128 or 256 bits for AES key	EE/ED; encrypted with RSA public key or agreed upon using Diffie-Hellman key agreement	Ephemeral in SDRAM

TLS Integrity Keys	HMAC keys	All HMAC key sizes	EE/ED; encrypted with RSA public key	Ephemeral in SDRAM
SSH Session Keys	168-bit Triple DES key or 128 or 256 bit AES key	112 bits for 168-bit Triple DES key; 128 or 256 bits for AES key	EE/ED; agreed upon using Diffie-Hellman key agreement	Ephemeral in SDRAM
AES Session Keys	128 or 256 bits	128 or 256 bits	IPSec IKE	Ephemeral in SDRAM
HMAC IPSec Keys	20-byte HMAC key	160 bits	IPSec IKE	Ephemeral in SDRAM
IPSec Initialization Vectors (not CSPs)	128 bits	N/A	IPSec IKE; ED	Ephemeral in SDRAM
HMAC Bypass Key	160 bits	160 bits	EE/ED; Encrypted with AES Firmware Encryption Key	Plaintext in HDD and SDRAM; hardcoded in firmware
AES Firmware Encryption Key	128 bits	128 bits	N/A	Plaintext in HDD and SDRAM; hardcoded in firmware
HMAC Firmware Verification Key	160 bits	160 bits	EE/ED; Encrypted with AES Firmware Encryption Key	Plaintext in HDD and SDRAM; hardcoded in firmware
Administrator Password	Minimum of 8 characters	1 in 2.04 X 10^{15}	EE; ED – Web Configurator; MD – console; RSA key transport – minimum 80 bits equivalent encryption strength	Plaintext in HDD

IPSec Preshared Secrets	Minimum of 8 characters	1 in 2.04 X 10^{15}	EE; ED – Web Configurator; MD – console; RSA key transport – minimum 80 bits equivalent encryption strength	Plaintext in HDD
Group Passwords	Minimum of 8 characters	1 in 2.04 X 10^{15}	EE; ED – Web Configurator; MD – console; RSA key transport – minimum 80 bits equivalent encryption strength	Plaintext in HDD
Shared Secret for the Access Point	Minimum of 8 characters	1 in 2.04 X 10^{15}	N/A; Used as HMAC key for HMAC computation	Plaintext in HDD
Team Shared Secret	Minimum of 8 characters	1 in 2.04 X 10^{15}	N/A; Used as HMAC key for HMAC computation	Plaintext in HDD
PRNG Seed Key (AES Key)	256 bits	256 bits	Internally generated with /dev/urandom PRNG	Ephemeral in SDRAM
PRNG Seed	128 bits	128 bits	Internally generated with /dev/urandom PRNG	Ephemeral in SDRAM

Table 9 – Cryptographic Keys and Other Critical Security Parameters Table

Table 10 specifies the pseudo-random number generators utilized by the cryptographic modules.

Identification	Type	Usage
ANSI X9.31 Appendix A.2.4 Using the 3-Key Triple DES and AES PRNG using AES with 256-bit keys	Approved	Used when random data is needed when generating an RSA key pair or a Diffie-Hellman key pair
/dev/urandom PRNG	Not Approved	Generation of seed keys and seed values for approved PRNG

Table 10 – Pseudo-Random Number Generators

Table 11 specifies for all cryptographic keys and other CSPs, whether or not they are output, and, if so, the format in which they are output and their destination.

Identification	Output	Destination	Format
IPSec Local X.509 Certificates RSA Public Keys (not CSPs)	Yes	To Backup Computer	Encrypted with TLS Session Key
IPSec RSA Private Keys	Yes	To Backup Computer	Encrypted with TLS Session Key
IPSec CA X.509 Certificate Public Key (not a CSP)	Yes	To Backup Computer	Encrypted with TLS Session Key
IPSec CA RSA Private Key	Yes	To Backup Computer	Encrypted with TLS Session Key
SOAP X.509 Certificates RSA Public Keys (not CSPs)	Yes	To Backup Computer	Encrypted with TLS Session Key
SOAP RSA Private Keys	Yes	To Backup Computer	Encrypted with TLS Session Key
Web Server X.509 Certificates RSA Public Keys (not CSPs)	Yes	To Backup Computer	Encrypted with TLS Session Key
Web Server RSA Private Keys	Yes	To Backup Computer	Encrypted with TLS Session Key
RADIUS EAP X.509 Certificates RSA Public Keys (not CSPs)	Yes	To Backup Computer	Encrypted with TLS Session Key
RADIUS EAP RSA Private Keys	Yes	To Backup Computer	Encrypted with TLS Session Key

CA X.509 Certificates RSA Public Keys (not CSPs)	Yes	To Backup Computer	Encrypted with TLS Session Key
Controller X.509 Certificate RSA Public Key (not a CSP)	Yes	To HP MSM4xx Access Points	Plaintext
Controller RSA Private Key	No	Not Applicable	Not Applicable
Access Points X.509 Certificates RSA Public Keys (not CSPs)	Yes	To HP MSM4xx Access Points	Plaintext
Slave Controllers X.509 Certificates RSA Public Keys (not CSPs)	Yes	To Slave Controllers	Plaintext
Diffie-Hellman Private Key	No	Not Applicable	Not Applicable
Diffie-Hellman Public Keys (not CSPs)	No	To HP MSM4xx Access Points, RADIUS Server, or Management Computer	Plaintext
TLS Session Keys	Yes	To HP MSM4xx Access Points or Management Computer	Encrypted with RSA Public Key
TLS Integrity Keys	Yes	To HP MSM4xx Access Points or Management Computer	Encrypted with RSA Public Key
SSH Session Keys	No	Not Applicable	Not Applicable
AES Session Keys	No	Not Applicable	Not Applicable
HMAC IPSec Keys	No	Not Applicable	Not Applicable
IPSec Initialization Vectors	Yes	To RADIUS Server or Management Computer	Plaintext
HMAC Bypass Key	No	Not Applicable	Not Applicable
AES Firmware Encryption Key	No	Not Applicable	Not Applicable
HMAC Firmware Verification Key	No	Not Applicable	Not Applicable
Administrator Password	Yes	To Backup Computer	Encrypted with TLS Session Key
IPSec Preshared Secrets	Yes	To Backup Computer	Encrypted with TLS Session Key

Group Passwords	Yes	To Backup Computer	Encrypted with TLS Session Key
Shared Secret for the Access Point	No	Not Applicable	Not Applicable
Team Shared Secret	No	Not Applicable	Not Applicable
PRNG Seed Key (AES Key)	No	Not Applicable	Not Applicable
PRNG Seed	No	Not Applicable	Not Applicable

Table 11 – Cryptographic Module Cryptographic Key and Other CSP Output

Table 12 specifies the access to cryptographic keys and other CSPs that an operator has to each of the cryptographic keys and other CSPs for all services.

Service	Cryptographic Keys and CSPs	Type(s) of Access (e.g., Read, Write, Execute)
Show Status	Administrator Password	E
	TLS Session Keys	E
	TLS Integrity Keys	E
Perform Power-Up Self-Tests	AES Keys, Triple DES Keys, RSA Public and Private Keys, HMAC Keys, PRNG Seed, PRNG Seed Key (Power-Up Self-Test Only Keys – not CSPs)	E
	Administrator Password (for command)	E
	TLS Session Key (for command)	E
	TLS Integrity Key (for command)	E

Perform IPSec IKE	Administrator Password	E
	IPSec Preshared Secrets	E
	IPSec Group Passwords	E
	IPSec Local X.509 Certificates RSA Public Keys (not CSPs)	W, E
	IPSec RSA Private Keys	W, E
	IPSec CA X.509 Certificate RSA Public Key (not a CSP)	E
	IPSec CA RSA Private Key	E
	PRNG Seed	W, E
	PRNG Seed Key	W, E
	AES Session Keys	W
	HMAC IPSec Keys	W
	HMAC Bypass Key	E
	Diffie-Hellman Private Keys	W, E
	Diffie-Hellman Public (not CSPs)	W, E
Perform IPSec ESP Transfers	AES Session Keys	E
	HMAC IPSec Keys	E
	IPSec Initialization Vectors (not CSPs)	W, E
Perform Plaintext Data Transfer	Administrator Password	E
	HMAC Bypass Key	E
Access Point Management	Administrator Password	E
	Shared Secret for the Access Point	E
	CA X.509 Certificate RSA Public Key (not a CSP)	E
	Controller X.509 Certificate RSA Public Key (not a CSP)	W, E
	Controller RSA Private Key	W
	Access Points X.509 Certificates RSA Public Keys (not CSPs)	W, E
	RADIUS EAP X.509 Certificates RSA Public Keys (not CSPs)	W, E
	RADIUS EAP RSA Private Keys	W
	Diffie-Hellman Private Keys	W, E
	Diffie-Hellman Public Keys (not CSPs)	W, E
	TLS Session Keys	W, E
	TLS Integrity Keys	W, E
	PRNG Seed	W, E
	PRNG Seed Key	W, E

Controller Teaming	Administrator Password	E
	Team Shared Secret	E
	CA X.509 Certificate RSA Public Key (not a CSP)	E
	Controller X.509 Certificate RSA Public Key (not a CSP)	W, E
	Controller RSA Private Key	W, E
	Slave Controllers X.509 Certificate RSA Public Keys (not CSPs)	W, E
	Diffie-Hellman Private Keys	W, E
	Diffie-Hellman Public Keys (not CSPs)	W, E
	TLS Session Keys	W, E
	TLS Integrity Keys	W, E
	PRNG Seed	W, E
	PRNG Seed Key	W, E
Management of HP MSM765zl Mobility Controller through TLS	Administrator Password	E
	Web Server X.509 Certificates RSA Public Keys (not CSPs)	R, W
	Web Server RSA Private Keys	W
	CA X.509 Certificates RSA Public Key (not a CSP)	E
	Diffie-Hellman Private Keys	W, E
	Diffie-Hellman Public Keys (not CSPs)	W, E
	TLS Session Keys	W, E
	TLS Integrity Keys	W, E
	PRNG Seed	W, E
	PRNG Seed Key	W, E
Management of HP MSM765zl Mobility Controller through SSH	Administrator Password	E
	Diffie-Hellman Private Keys	W, E
	Diffie-Hellman Public Keys (not CSPs)	W, E
	SSH Session Keys	W, E
	PRNG Seed	W, E
	PRNG Seed Key	W, E

Management of HP MSM765zl Mobility Controller through SOAP	SOAP X.509 Certificates RSA Public Keys (not CSPs)	R, W
	SOAP RSA Private Keys	W
	Diffie-Hellman Private Keys	W, E
	Diffie-Hellman Public Keys (not CSPs)	W, E
	TLS Session Keys	W, E
	TLS Integrity Keys	W, E
	PRNG Seed	W, E
	PRNG Seed Key	W, E
Firmware Load	Administrator Password	E
	TLS Session Key	E
	TLS Integrity Key	E
	AES Firmware Encryption Key	E
	HMAC Firmware Verification Key	E
Configuration File Export	Administrator Password	E
	AES Session Key	E
	TLS Session Key	E
	TLS Integrity Key	E
	IPSec Local X.509 Certificates RSA Public Keys (not CSPs)	W
	IPSec RSA Private Keys	W
	IPSec CA X.509 Certificate Public Key (not a CSP)	W
	IPSec CA RSA Private Key	W
	SOAP X.509 Certificates RSA Public Keys (not CSPs)	W
	SOAP RSA Private Keys	W
	Web Server X.509 Certificates RSA Public Keys (not CSPs)	W
	Web Server RSA Private Keys	W
	RADIUS EAP X.509 Certificates RSA Public Keys (not CSPs)	W
	RADIUS EAP RSA Private Keys	W
	CA X.509 Certificates RSA Public Keys (not CSPs)	W
	IPSec Preshared Secrets	W
	IPSec Group Passwords	W
	Shared Secret for the Access Point	W
	Team Shared Secret	W

Plaintext Key and CSP Zeroization	Administrator Password	E, W
	TLS Session Key	E
	TLS Integrity Key	E
	IPSec Local X.509 Certificates RSA Public Keys (not CSPs)	W
	IPSec RSA Private Keys	W
	IPSec CA X.509 Certificate Public Key (not a CSP)	W
	IPSec CA RSA Private Key	W
	SOAP X.509 Certificates RSA Public Keys (not CSPs)	W
	SOAP RSA Private Keys	W
	Web Server X.509 Certificates RSA Public Keys (not CSPs)	W
	Web Server RSA Private Keys	W
	RADIUS EAP X.509 Certificates RSA Public Keys (not CSPs)	W
	RADIUS EAP RSA Private Keys	W
	CA X.509 Certificates RSA Public Keys (not CSPs)	W
	Controller X.509 Certificate RSA Public Key (not a CSP)	W
	Controller RSA Private Key	W
	Access Points X.509 Certificates RSA Public Keys (not CSPs)	W
	Slave Controllers X.509 Certificates RSA Public Keys (not CSPs)	W
	IPSec Preshared Secrets	W
	IPSec Group Passwords	W
	Shared Secret for the Access Point	W
	Team Shared Secret	W

Table 12 – Access Rights within Services

7.6 IMPLEMENTED CRYPTOGRAPHIC ALGORITHMS

The following table outlines the FIPS approved cryptographic algorithms that are implemented in the cryptographic modules, along with the Cryptographic Algorithm Validation Program (CAVP) validation number for each algorithm.

FIPS Approved Cryptographic Algorithm	Algorithm Validation Number(s)
AES (128 or 256 bit keys) CBC encryption in firmware (2 implementations)	1824 and 1825
*Triple DES (168-bit keys) encryption and decryption in CBC mode in firmware (2 implementations)	1177 and 1178
*SHA-1 hashing (firmware – 2 implementations)	1603 and 1604
HMAC-SHA-1 message authentication (firmware – 2 implementations)	1107 and 1079
RSA (2048 bit key PKCS#1 v1.5 signature verification and ANSI X9.31 key generation in firmware and 1024 and 2048 bit PKCS#1 v1.5 RSA signature verification in firmware)	917 and 921
*ANSI X9.31 PRNG using 256-bit AES	961

* For deprecation information, see NIST SP800-131A.

Table 13 – Implemented FIPS Approved Cryptographic Algorithms

The cryptographic modules implement the following non-FIPS approved cryptographic algorithms: RC4, MD5, HMAC-MD5, Diffie-Hellman key agreement with 1024 bit (Group 2) or 1536 bit (Group 5) keys (key establishment methodology provides 80 or 96 bits of equivalent encryption strength), and RSA key transport with 1024 or 2048 bit keys (key transport method provides 80 or 112 bits of equivalent key strength).

The cryptographic modules also implement SHA-224, SHA-256, SHA-384, SHA-512, HMAC-SHA-224, HMAC-SHA-256, HMAC-SHA-384, and HMAC-SHA-512, which are not FIPS compliant because all cryptographic module requirements for these cryptographic algorithms have not been met.

8 PHYSICAL SECURITY POLICY

8.1 OVERVIEW

Section 8 Physical Security Policy discusses the physical security mechanisms that are implemented to protect the cryptographic modules and the actions that are required to ensure that the physical security of the cryptographic module is maintained.

8.2 PHYSICAL SECURITY MECHANISMS

8.2.1 Tamper Evident Seals, Opacity Shields, and High Performance Fan Tray

The cryptographic modules are completely enclosed within metal Ethernet switch chassis.

The cryptographic modules are protected by tamper evident seals on all sides of the switch chassis. Opacity shields are to be installed on either side of the switch chassis and a high performance fan tray is to be used at the back of the chassis to cover the fan. See sections **2.3** and **2.4** for details on where and how to install the opacity shields and high performance fan tray and on how and where to affix the tamper evident seals.

The tamper evident seals provided by HP should be kept in a locked cabinet, accessible only by the Administrator (Crypto-Officer) for the particular cryptographic module. The cryptographic module should be kept in a locked cabinet or room until the opacity shields and high performance fan tray are installed on the chassis and until the tamper evident seals can be affixed where required.

8.3 INSPECTION AND TESTING

Physical Security Mechanism	Recommended Frequency of Inspection/Test	Inspection/Test Guidance Details
High Performance Fan Tray and Opacity Shields	Monthly	Examine visually to ensure the fan tray or opacity shields have not been bent, have not had holes drilled in them, or have not been removed.
Tamper Evident Seals	Weekly preferred but at least monthly	Examine visually for evidence that any seal has been damaged, broken, or missing

Table 14 – Inspection/Testing of Physical Security Mechanisms

The inspection of the tamper evident seals, high performance fan tray, and opacity shields is to be done by the Administrator (Crypto-Officer).

9 SECURITY POLICY FOR MITIGATION OF OTHER ATTACKS

9.1 OVERVIEW

The cryptographic modules do not mitigate against specific attacks for which testable requirements are not defined in FIPS 140-2.

9.2 MECHANISMS IMPLEMENTED

Not applicable

9.3 MITIGATION SUMMARY

Other Attacks	Mitigation Mechanisms	Specific Limitations
None	N/A	N/A

Table 15 – Mitigation of Other Attacks