POINT TO POINT WIRELESS SOLUTIONS GROUP

MOTOROLA

Motorola PTP 600 Series Cryptographic Module Security Policy

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Reference: phn-1294 003v000

16 Feb 2011

This document describes the PTP 600 Series FIPS 140-2 Security Policy. It may be freely distributed in its entirety without modification.

Revision History

Version	Change Date	Change Description	Author
001v000	25 June 2010	First issue	RAC
002v001	14 Dec 2010	Updated per CMVP comments	RAC
003v000	16 Feb 2011	Updated per CMVP comments	RAC

Table of Contents

List of Tables

List of Figures

1 Introduction

This document describes the security policy for Motorola PTP 600 Series Point to Point Wireless Ethernet Bridges.

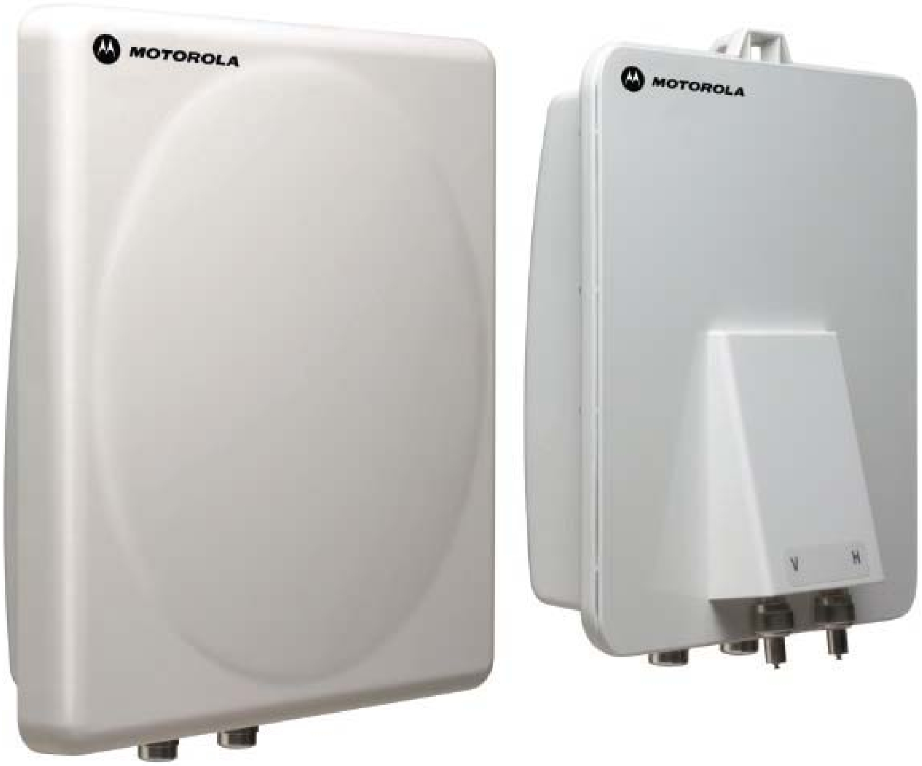
The Motorola PTP 600 Series (hereafter the PTP 600 or PTP 600 Series) devices are a multi-chip standalone cryptographic modules encased in hard opaque commercial grade metal cases. Operating in the 2.5, 4.5, 4.8, 4.9, 5.5 and 5.9 GHz frequency bands at Ethernet data rates up to 300 Mbps, the systems are designed for virtually any environment – non-line-of-sight, line-of-sight, and high interference – where high throughput is a major requirement and/or single or dual T1/E1 capability is needed.

Through Motorola’s unique combination of technologies, PTP 600 Series solutions enhance link performance in a variety of applications, including T1 replacement, Voice-over-IP, video surveillance, distance learning, telemedicine, and high-speed backhaul.

The primary purpose for this device is to provide data security for Internet Protocol (IP) traffic. The cryptographic boundary of the wireless unit is the unit’s external casing. There are two product variants that have a different casing arrangement. Firstly the Integrated wireless units as the name suggests has an integrated RF antenna. The second product variant is named the Connectorized product variant which is identical to the Integrated product except the antenna is replaced by a metal plate with two ‘N’ type RF connectors. For the purposes of FIPS Approval the integrated antenna is excluded from the cryptographic boundary.

Figure 1: PTP 600 Wireless Units

Integrated **Connectorized**

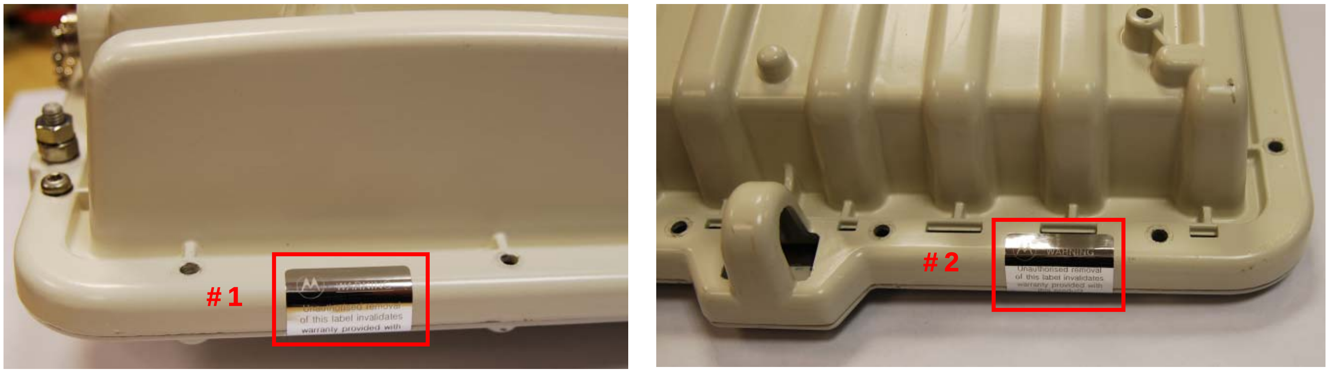


The purpose of this security policy is to validate the Motorola PTP 600 Series (HW P/Ns BP5830BHC, BP5830BHC15, BP5530BHC, BP5530BHC15, WB2781,WB3039, WB3037, WB3092, WB3094, WB3387, WB3389, WB3222, BP5830BH, BP5830BH15, BP5530BH, BP5530BH15, WB2780, WB3036, WB3038, WB3091, WB3093, WB3386, WB3388 and WB3221; FW Version PTP600 08-50) submitted for FIPS 140-2 Level 2 validation.

1.1 Anti Tamper Label Placement

Figure 2: Images showing the anti-tamper labels

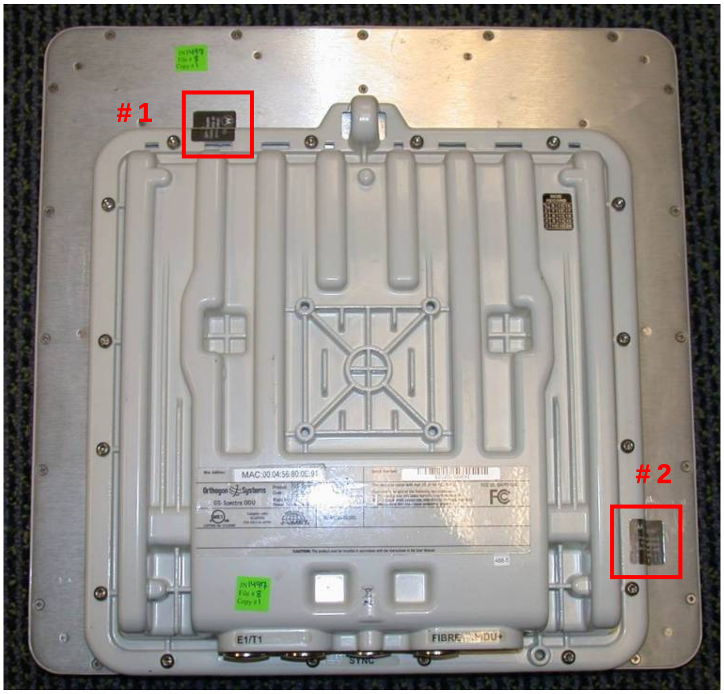
Connectorized PTP 600 Unit (2 Labels Wrapping around Enclosure Edge)


#1
WARNING
Unauthorised removal of this label invalidates warranty provided with
#2
WARNING
Unauthorised removal of this label invalidates warranty provided with

Left (vertical)

Top (horizontal)

Integrated PTP 600 Unit (2 Labels on Underside)



Note: The two anti-tamper labels on the Integrated module are affixed around the edge of the cover so that they make contact with both metal surfaces.

The anti-tamper labels shall be installed for the module to operate in a FIPS Approved mode of operation.

The module is delivered to the operator with the anti-tamper labels applied. A hardware security upgrade kit containing additional anti-tamper labels may be obtained from Motorola. The hardware security upgrade kit is P/N WB3593.

The Crypto-Officer is the role responsible for:

- Securing and controlling any unused anti-tamper labels.
- Controlling and observing module reconfigurations (i.e., firmware updates) during which the anti-tamper labels would be removed and reinstalled to verify that the module remains secure during such updates and that it is returned to the FIPS Approved mode after the updates are complete.

Before the anti-tamper labels can be replaced, the module surface must be prepared using the following procedure:

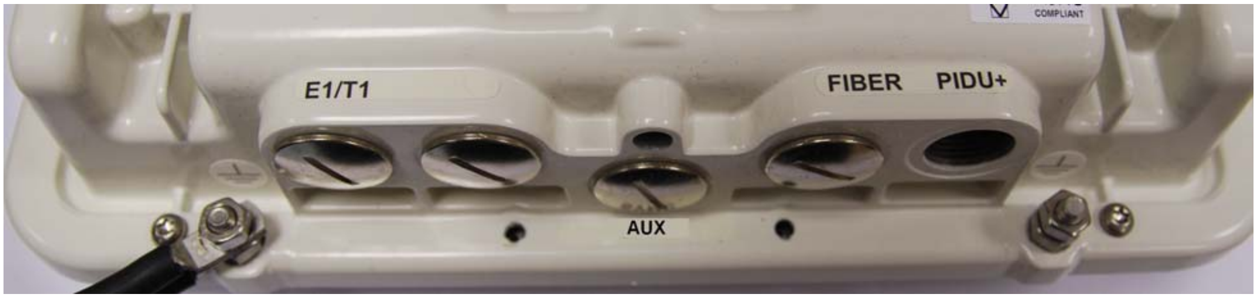
All positions where labels are to be placed must be cleaned with a cloth wetted with IPA[1] before the labels can placed.

The glued side of the label must not be touched during the label placement. If it is inevitable, tweezer must be used for handling.

Motorola recommends that the operator inspects the integrity of the anti-tamper labels a minimum of every 30 days.

1.2 Port Identification

Figure 3: Image showing port identification



The module ports are as follows:

- **E1/T1**: RJ45 socket for optional E1 or T1 network connection.
- **AUX**: Auxiliary RJ45 socket for out-of-band management interface (Management Port) or GPS connection (Sync Port).
- **FIBER**: Fiber optic socket for optional network connection. Subsequently referred to as the Fiber Data Port.
- **PIDU+**: RJ45 socket for connecting to power supply and network via the PIDU Plus. Referred to as the Copper Data Port.

[1] IPA is a solvent/cleaner called Isopropyl Alcohol

1.3 The PTP 600 Series

The product family consists of integrated (RF antenna built in) and connectorized (RF connectors to external antennas) variants. In addition each product variant can be purchased as a sub-variant of full or lite (when the full version offers 50% more Ethernet throughput for the same RF propagation conditions. And finally the PTP 600 can be purchased in the following frequency variants: 2.5, 4.5, 4.8, 4.9, 5.4, 5.5, 5.8 and 5.9 GHz. Table 1 lists the frequency ranges supported by each PTP 600 module.

Table 1: The Motorola PTP 600 Series

Product Name	Integrated / Connectorized	Full / Lite	HW Part Number	Frequency Range	
				Bottom (MHz)	Top (MHz)
PTP58600	Integrated	Full	BP5830BH	5725	5850
		Lite	BP5830BH15		
	Connectorized	Full	BP5830BHC		
		Lite	BP5830BHC15		
PTP54600	Integrated	Full	BP5530BH	5470	5725
		Lite	BP5530BH15		
	Connectorized	Full	BP5530BHC		
		Lite	BP5530BHC15		
PTP25600	Integrated	Full	WB2780	2496	2690
	Connectorized		WB2781		
PTP45600	Integrated	Full	WB3036	4400	4600
		Lite	WB3038		
	Connectorized	Full	WB3037		
		Lite	WB3039		
PTP48600	Integrated	Full	WB3386	4700	5000
		Lite	WB3388		
	Connectorized	Full	WB3387		
		Lite	WB3389		
PTP49600	Integrated	Full	WB3221	4900	4990
	Connectorized	Full	WB3222		
PTP59600	Integrated	Full	WB3091	5825	5925
		Lite	WB3093		
	Connectorized	Full	WB3092		
		Lite	WB3094		

Figure 4: Connectorized PTP 600 Unit

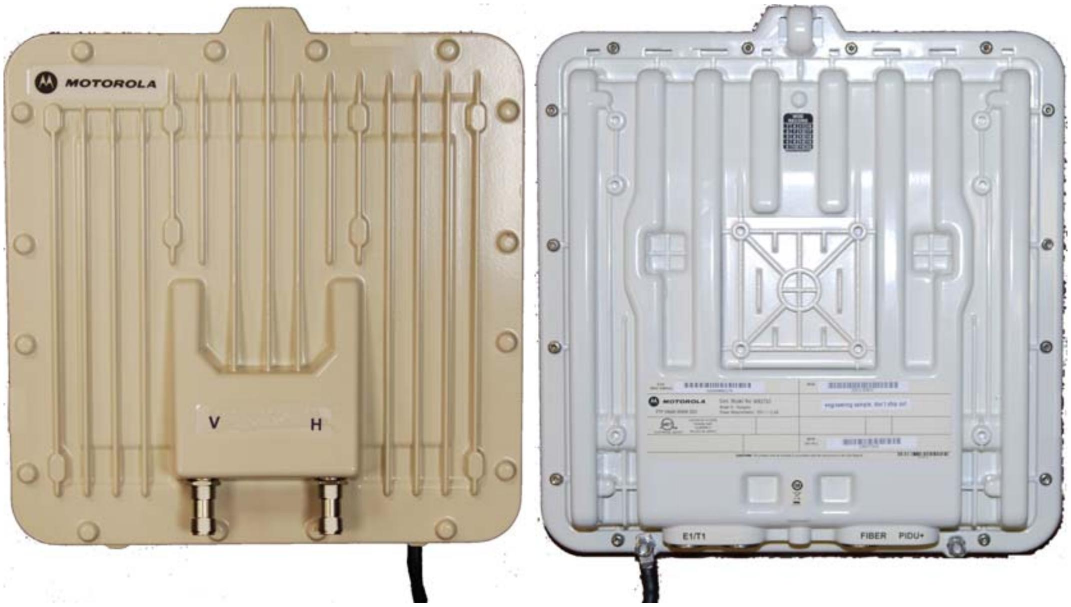
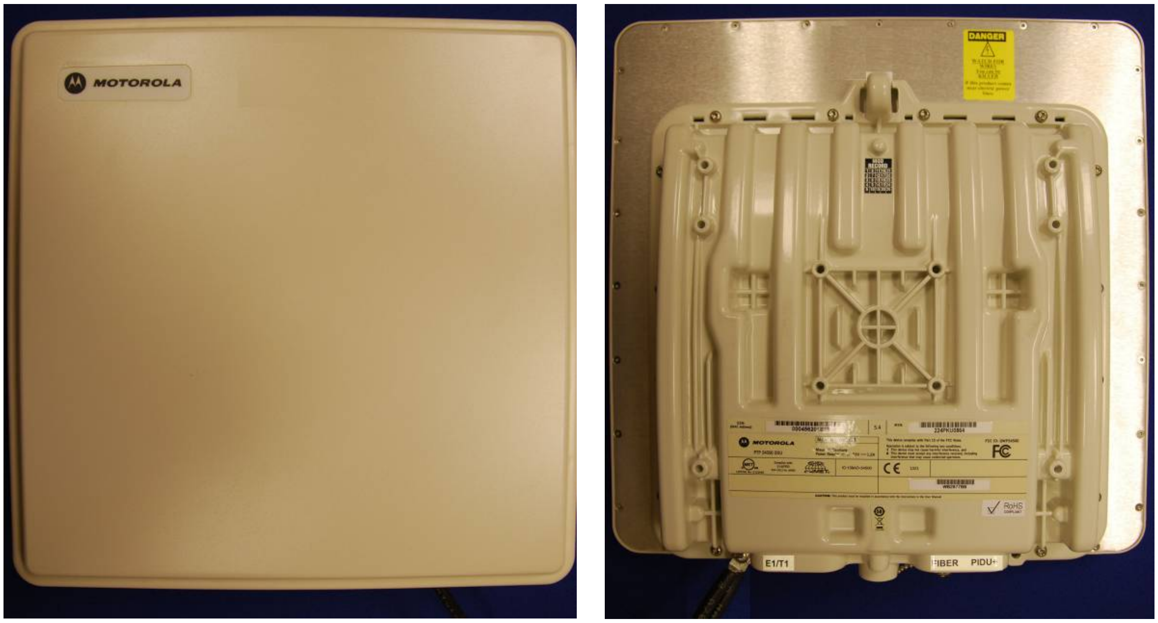


Figure 5: Integrated PTP 600 Unit



1.4 References

a. FIPS PUB 186-2, Federal Information Processing Standards Publication 186-2, Feb 2000.

b. FIPS PUB 180-3, Federal Information Processing Standards Publication 180-3, October 2008.

c. FIPS PUB 140-2, Federal Information Processing Standards Publication 140-2, 25th May 2001.

d. FIPS PUB 197, Federal Information Processing Standards Publication 192, 26th November 2001.

e. DSAVS, Digital Signature Algorithm Validation Suite, 10th March 2004.

f. PTP 600 Series User Guide. phn-0896 007v001, Monday 30th June 2008

g. X.680, ASN.1 Encoding Rules: specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER), (07/02)

h. PKCS #8: Private-Key Information Syntax Standard, Version 1.2, November 1, 1993

i. PKCS #1: Public Key Cryptography Standards (PKCS), Version 2,1, June 14 2001

j. RFC 4346, The Transport Layer Security Protocol version 1.0, April 2006.

k. NIST SP 800-90 Recommendation for Random Number Generators Using Deterministic Random Bit Generators. March 2007.

1.5 Acronyms

CA	Certification Authority
CO	Cryptographic Officer
CSP	Critical Security Parameter
DER	Distinguished Encoding Rules
DES	Data Encryption Standard
DSA	Digital Signature Algorithm
FIPS	Federal Information Processing Standard
HMAC	Hashed Message Authentication Code
KAT	Known Answer Test
PTP	Point to Point
SA	System Administrator
SNMP	Simple Network Management Protocol
TLS	Transport Layer Security

2 Security Level

The cryptographic module meets the overall requirements applicable to Level 2 security of FIPS 140-2.

Table 2: Module Security Level Specification

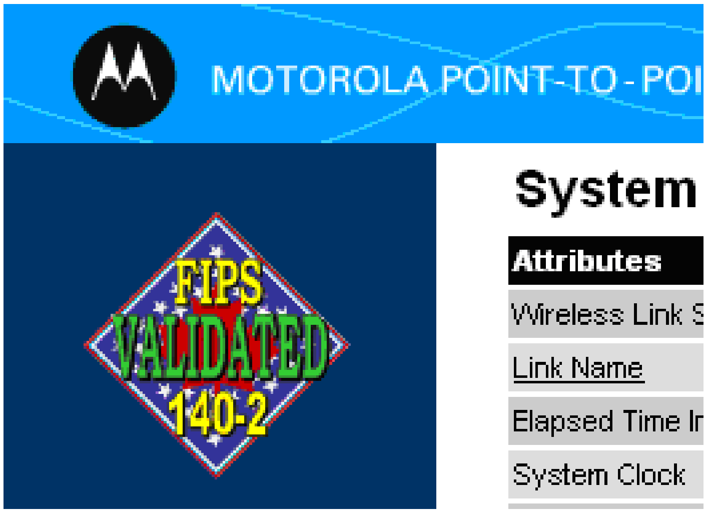
Security Requirements Section	FIPS 140-2 Level
Cryptographic Module Specification	3
Module Ports and Interfaces	2
Roles, Services and Authentication	3
Finite State Model	2
Physical Security	2
Operational Environment	N/A
Cryptographic Key Management	2
EMI/EMC	2
Self-Tests	2
Design Assurance	3
Mitigation of Other Attacks	N/A

3 Mode of Operation

3.1 Prerequisites for the Approved Mode of Operation

A user can verify that the wireless unit is capable of operating in FIPS mode by visually inspecting any management webpage and looking for the FIPS logo:

Figure 6: Indication of FIPS 140-2 capability



The FIPS logo on its own is not an indicator of correct FIPS configuration. The logo is present when the operator has a correct hardware, software and license line-up to allow FIPS mode. The operator must follow the procedure outlined in Section 3.2 to enter approved mode. When in approved mode, the FIPS logo will be displayed and the alarm that is used to indicate incorrect configuration will not be asserted.

If the FIPS logo is not displayed, proceed as follows:

1. Check that the hardware is capable of supporting FIPS 140-2. This includes checking the silver tamper-evident labels, the hardware platform part number and the hardware version.
2. If the hardware does not support FIPS 140-2, apply the hardware security upgrade kit.
3. Check the capability summary in the Software License Key page to ensure that the current license key supports AES and FIPS 140-2. If necessary, obtain an access key and generate a new license key.
4. Check the installed software version in the System Status page to ensure that the software image is FIPS validated. If necessary, upgrade to the latest FIPS validated image.

3.2 Configuring the Approved Mode of Operation

If the FIPS logo is displayed, the approved mode of operation can be configured using the Security Configuration Wizard.

3.2.1 Obtaining cryptographic material

Before starting the Security Configuration Wizard, ensure that the following cryptographic material has been generated using a FIPS-approved cryptographic generator:

- Key Of Keys
- TLS Private Key and Public Certificates
- Entropy Input
- Wireless Link Encryption Key for AES

3.2.2 Starting Security Configuration Wizard

To start the wizard, proceed as follows:

1. Select menu option **Security**. The Security Configuration Wizard page is displayed.
2. Review the summary of HTTPS/TLS security related parameters.
3. If any updates are required, select **Continue to Security Wizard**.

3.2.3 Step 1: Enter key of keys

To enter the Key Of Keys via the Security Wizard, proceed as follows:

1. The Step 1: Enter Key of Keys page is displayed.
2. Enter the generated key of keys in both the Key Of Keys and Confirm Key Of Keys fields.
3. Select **Next**.

3.2.4 Step 2: TLS private key and public certificate

To enter the TLS Private Key and Public Certificate via the Security Wizard, proceed as follows:

1. The Step 2: TLS Private Key and Public Certificate page is displayed.
2. If a valid TLS private key exists, then an SHA-1 thumbprint of the key is displayed. If this key is correct, then take no action. Otherwise, select **Browse** and select the generated private key file (.der).
3. If a valid TLS public certificate exists, then an SHA-1 thumbprint of the certificate is displayed. If this certificate is correct, then take no action. Otherwise, select **Browse** and select the generated certificate file (.der).
4. Select **Next**.

3.2.5 Step 3: User security banner

To enter the user security banner via the Security Wizard, proceed as follows:

1. The Step 3: User Security Banner page is displayed.
2. Update the User Defined Security Banner field.
3. Select **Next**.

3.2.6 Step 4: Random number entropy input

To enter the Entropy Input via the Security Wizard, proceed as follows:

1. The Step 4: Random Number Entropy Input page is displayed.
2. If valid entropy input exists, then an SHA-1 thumbprint of the input is displayed. If this input is correct, then take no action. Otherwise, enter the generated input in the Entropy Input and Confirm Entropy Input fields. If the two values are not identical, an error message is displayed.
3. Select **Next**.

3.2.7 Step 5: Enter the wireless link encryption key

To enter the wireless link encryption key via the Security Wizard, proceed as follows:

1. The Step 5: Enter The Wireless Link Encryption Key page is displayed.
2. Select the applicable value in the Encryption Algorithm field.
3. If a valid encryption key exists, then an SHA-1 thumbprint of the key is displayed. If this key is correct, then take no action. Otherwise, enter the generated key in the Wireless Link Encryption Key and Confirm Wireless Link Encryption Key fields. If the two values are not identical, an error message is displayed.
4. Select **Next**.

3.2.8 Step 6: HTTP and Telnet settings

To configure HTTP and Telnet via the Security Wizard, proceed as follows:

1. The Step 6: HTTP and Telnet Settings page is displayed.

2. Review and update the HTTP and Telnet attributes. If the unit is required to operate in FIPS 140-2 secure mode, HTTP, Telnet and SNMP Control must all be disabled.
3. Select **Next**.

3.2.9 Step 7: Commit security configuration

Review all changes that have been made in the Security Wizard. To ensure that the changes take effect, select **Commit Security Configuration**. The unit reboots and the changes take effect.

3.3 Checking that the unit is in the Approved Mode of Operation

The unit is ready to operate in FIPS 140-2 secure mode when both of the following conditions apply:

- The FIPS 140-2 capability logo is displayed in the navigation bar.
- The FIPS Operational Mode Alarm is not present in the Home page.

If the FIPS 140-2 capability logo is not displayed in the navigation bar, then return to 3.1 Prerequisites for the Approved Mode of Operation and check that all prerequisites are fulfilled.

If the FIPS 140-2 Operational Mode Alarm is present in the Home page, take action depending upon the alarm setting as follows:

- If the alarm is ‘FIPS mode is not configured’, then return to 3.2 Configuring the Approved Mode of Operation and check that all Security Wizard settings are correct for FIPS 140-2.
- If the alarm is ‘FIPS mode is configured, but not active’, then return to 3.2.8 Step 6: HTTP and Telnet settings and set the following attributes to ‘No’:
    - HTTP Access Enabled
    - Telnet Access Enabled
    - SNMP Control of HTTP And Telnet

3.4 Approved and non-approved modes of operation

3.4.1 Approved mode of operation

In the non-approved non-FIPS mode of operation it is possible to use all the approved algorithms of FIPS mode and also to use in the clear management protocols. No CSPs are shared between these modes of operation. A zeroise CSPs is forced if a user causes the unit to transit between modes.

In FIPS mode, the cryptographic module only supports FIPS Approved and allowed algorithms as follows:

Table 3: FIPS Approved and allowed algorithms

Algorithm	NIST Certificate Number
SHA-1 for hashing [b]	1101
DSA for digital signature verification of uploaded firmware images [e]	399
AES for wireless link encryption, TLS secure connection[j]. ECB, CBC modes; CFB mode	1144; 708
SP800-90 DRBG, CTR_DRBG see [k] section 10.2.1	21
HMAC-SHA-1	700
Triple-DES	863
RSA for key unwrapping during TLS Handshake (unapproved algorithm allowed in FIPS mode; key wrapping, key establishment methodology provides 80 bits of encryption strength)	N/A
MD5 used within TLS	N/A

Table 4: Management protocols in FIPS mode

Protocol	Cipher Suites supported by the module	Notes
TLS v1.0 & HTTP over TLS (HTTPS),	TLS_RSA_WITH_3DES_EDE_CBC_SHA TLS_RSA_WITH_AES_128_CBC_SHA TLS_RSA_WITH_AES_256_CBC_SHA	The module acts as the server endpoint in the TLS communication. The clients are authenticated at the application layer using passwords

3.4.2 Non-FIPS modes of operation

- Custom RNG[2]
- HTTP
- Unencrypted Wireless

4 Ports and Interfaces

The cryptographic module provides the following physical ports and logical interfaces:

Table 5: Ports and Interfaces

Port	Data Input	Data Output	Status Output	Control Input	Power Input
Fiber Data Port	✓	✓	✓	✓	✓
E1/T1 A	✓	✓			
E1/T1 B	✓	✓			
AUX Port	The AUX physical connector provides access to the Management Port and the Sync Port (see below).				
Sync Port	✓			✓	
Management Port	✓	✓	✓	✓	✓
PIDU+/ Copper Data Port	✓	✓	✓	✓	✓
RF Horizontal*	✓	✓	✓	✓	
RF Vertical*	✓	✓	✓	✓	
Earthing					✓

* For connection of external antenna. Within the module boundary for the Connectorized version; not exposed for the Integrated version.

[2] A custom RNG is included in the operational code. This RNG is not utilised in FIPS mode.

5 Identification and Authentication Policy

The PTP 600 supports identity-based authentication. The following sections outline the roles that can be assigned to each operator.

5.1 Assumption of Roles

Table 6: Roles and Authentication

Role	Type of Authentication	Authentication Mechanism
Security Officer (Crypto-Officer)	Username and password verification	Username and password entered over a TLS socket to the HTTPS server and verified by wireless unit.
System Administrator	Username and password verification	Username and password entered over a TLS socket to the HTTPS server and verified by wireless unit.
Read-only user	Username and password verification	Username and password entered over a TLS socket to the HTTPS server and verified by wireless unit

6 Access Control Policy

6.1 Authentication Strength

In FIPS mode password complexity is enforced:

The complexity rules are:

The password MUST contain at least two characters for each of the four groups:

1. lowercase letter
2. uppercase letter
3. decimal numerals
4. special characters[3]

The password MUST have a minimum length of 10 characters

The passwords MUST NOT contain the user's username.

The maximum number of repeated characters in a password is 2.

When passwords are changed at least four distinct character MUST change

Password MUST not be reused for the next 10 passwords.

[3] Allowable special characters are: `` !"#$%&'()*+,-./:;<=>?@[\]^_`{|}~ ``

Only three authentication attempts are permitted for any user within any one minute period.

A password with minimum complexity can be constructed by selecting, 2 lowercase, 2 uppercase, 2 special characters and 4 numeric characters. The strength of this combination is calculated as follows:

$$p = \frac{1}{26^2} \cdot \frac{1}{26^2} \cdot \frac{1}{32^2} \cdot \frac{1}{10^4} = \frac{1}{4.7 \times 10^{12}}$$

Test	Strength
1 in 100,000 in any minute	Pass strength is 1 in 4.7 x 10^{12}
1 in 1,000,000 at any attempt	Pass strength is 1 in 1.5 x 10^{12}

6.2 Roles and Services

The services available to authenticated users are summarised in Table 7 and Table 8. These roles and services are also available in non-FIPS mode.

Table 7 also identified the CSP access type for each CSP in braces after each CSP. {R}ead, {W}rite and {Z}eroize.

Table 7: Role Based Services and CSP Access

Role	Service	CSPs
RO, SA, CO	Authentication	Authenticate, password {R,W}, HMAC session key {W}, key of keys {R} The CO has R and W access to all user passwords, CO password, SA password and RO password. Users with the SA or RO role only has R and W access to their associated passwords
SA, CO	Firmware Upgrade	DSA Public key {R}
CO	Encrypt	Encrypt / Decrypt wireless traffic using wireless encryption key {R} , key of keys {R}
	TLS	Authenticate and key exchange using TLS private key {R}, entropy seed {R}, key of keys {R} TLS pre-master secret {R, W}, TLS master secret {R, W} and TLS keyset {R}
CO	Zeroise	Key of keys {Z} (Also initiates system reboot, which zeroizes all CSPs in volatile memory.)
	Self Test	N/A

Role	Service	CSPs
CO	Cryptographic Key Management	Key of keys, TLS X509 private key {R, W}, wireless link encryption key {R, W}, entropy seed {R, W}
CO, SA	Module Configuration	N/A
CO, SA	Reboot	HMAC Session Key {Z}, TLS Key Set {Z}
CO, SA, RO	View Status	N/A
CO, SA, RO	View Configuration	N/A
CO, SA, RO	Logout	HMAC session key {W}
CO, SA, RO	SNMP (view of status and configuration)	N/A

Table 8: Authenticated Services

Service	Role	Purpose
Authentication	CO, SA, RO	Authenticate user logins
Firmware Upgrade	CO, SA	Upgrade operational firmware
Encrypt	CO	Encrypt / Decrypt wireless traffic
Zeroise	CO	Zeroise Key of Keys (Also initiates system reboot, which zeroizes all CSPs in volatile memory.)
Cryptographic Key management	CO	Cryptographic key data entry and CSP zeroisation
Module Configuration	CO	A selection of standard wireless unit configuration settings
Reboot	CO	Reboot the wireless unit
View Status	SA, CO, RO	View module status including hardware and firmware versions
View Configuration	RO, SA, CO	View all system administrative configuration
Logout	RO, SA, CO	Invalidate any previously HMAC signed cookies by regenerating the HMAC session key
SNMP	RO, SA, CO	View status and configuration using the SNMP management protocol. It is important to note that no CSPs are transported using the SNMP protocol

6.3 Unauthenticated Services:

The services available to unauthenticated users are summarised in Table 9.

Table 9: Unauthenticated Services

Service	Role	Purpose
Self Test	-	This service executes a suite of cryptographic self tests as required by FIPS 140-2 level 2
TLS	-	Implement the TLS secure communication protocol

6.4 Service I/O Specification

Table 10: Specification of Service Inputs & Outputs

Service	Control Input	Data Input	Data Output	Status Output
Authentication	Authentication request	Username & password Or HMAC signed cookie	HMAC signed cookie	Status OK if username and password match plain text username and password CSP
Firmware Upgrade	Upgrade request	Plaintext header + BZIP2 compressed image	DSA verification 'v' vector	Status OK if 'v' = 'r'
Zeroise	Zeroise Request	None	None	True if key of keys removed from non-volatile storage and system reboot
Self Test	System reboot	Self Test keys and test vectors	None	True if algorithm self test successful. Otherwise false
Cryptographic Key Management	Data Entry	Key of Keys, TLS Private key, TLS public certificate, entropy seed, passwords	None	True if key correctly validated. Otherwise false
Module Configuration	Data Entry	Wireless Configuration	None	True if configuration parameters correctly validated. Otherwise false

Service	Control Input	Data Input	Data Output	Status Output
Reboot	Data Entry	None	None	None
View Status	View Status Request	None	Status information	None
View Configuration	View Configuration Request	None	Configuration Information	None
Logout	Logout Request	None	None	OK

6.5 Definition of Critical Security Parameters

The following CSPs and public keys are contained in the modules FLASH memory. These are NOT read into SDRAM by the FIPS module.

6.5.1 Key of Keys

The key of keys is stored as a 128/256-bit AES key and is stored in the CSP FLASH bank. The key of keys is read during the DMGR initialisation procedure and the key expansion is stored in SDRAM. All DMGR attributes that are marked as CSPs are encrypted/decrypted as they are written/read from the configuration FLASH banks using the key expansion.

The integrity of the key of keys is validated by the user with a CRC32.

The key of keys can be configured or erased by a user with the security officer role.

6.5.2 TLS X509 Private Key

TLS private key is used by the HTTPS server. The private key is designated as a DMGR CSP and is encrypted using the key of keys.

A key size of 1024-bits is supported

Entered via a secure webpage upload

Generated by a FIPS approved algorithm outside the module

Validity checked by performing a modulus check on private and associated public certificate.

The X.509 private key can be configured or erased by a user with the security officer role.

6.5.3 RNG Entropy

SP800-90 DRBG entropy string is used by the TLS stack and other random processes. The entropy string is designated as a DMGR CSP and is encrypted using the key of keys.

A key size of 512-bits is supported

Entered via a secure webpage upload

Generated by a FIPS approved algorithm outside the module

The entropy string can be configured or erased by a user with the security officer role.

6.5.4 HMAC Session Key

The HMAC session key is used by the authentication process to sign and verify HMAC signed web authentication cookies

The HMAC session key is generated using the FIPS approved DRBG. The session key is overwritten every time a user successfully authenticates to the PTP 600 module.

The authentication cookie is used by the PTP 600 module to create and store session information. Each time a webpage is clicked by an authenticated user the session cookie is replayed by the browser to the PTP 600 module. After receiving the cookie the PTP 600 module uses the HMAC session key and arguments extracted from the cookie to regenerate the HMAC. If the HMAC is successfully regenerated the user is allowed access to the module otherwise the user is forced to re-authenticate.

6.5.5 Wireless Encryption Key

The wireless encryption key is used to encrypt/decrypt all control and data sent over the wireless MAC layer.

6.5.6 TLS Key Set

The TLS keyset comprises of the session keys. The TLS service is used for authenticity and privacy when transporting CSPs from the user’s browser to PTP 600 module. The CSPs that are protected are detailed in section 6.5

The TLS keyset is generated by TLS ”Approved“ PRF with the help of TLS Master secret and server and client random.

The server random is generated using the approved DRBG. The client random is generated by the operator’s browser.

6.5.7 TLS pre-master secret and TLS master secret

The 46 byte pre-master secret is generated by the operator’s browser, PCKS#1 v1.5 encoded, wrapped with RSA 1024.

The master-secret is generated using TLS PRF:

master_secret = PRF(pre_master_secret, "master secret", ClientHello.random + ServerHello.random)

The TLS Pre-Master Secret and TLS Master Secret are zeroized after use.

6.5.8 Passwords

The PTP 600 has 10 configurable user accounts. Each user account has an associated password. All passwords are designated as DMGR CSPs and are encrypted using the key of keys.

A user with the security officer role can reset all user account passwords. Users with system administrator or read only user roles can reset their own passwords.

6.6 CSP Encrypted by Key of Keys

The following CSPs are AES encrypted [i] using a key of keys approach and are not zeroised.

- Wireless Encryption Key – This key is used for the Encryption/Decryption of all traffic over the wireless link.
- System passwords
- TLS X.509 private key
- DRBG Entropy seed

6.7 Definition of Public Keys

The following are the public keys contained in the module:

- TLS X509 Public Certificate (located in the configuration FLASH bank). The certificate can be modified by a user uploading a new valid certificate. The longevity of the key is encoded in the X509 certificate expiry time.
- Firmware DSA 1024-bit public key (p, q, g and y vectors) (located in the FIPS module code and defined as static const unsigned char arrays). The DSA public key cannot be erased and can only be replaced by upgrading the firmware.
- TLS Private Key / Public Certificate Modulus Check

6.8 Definition of CSP Modes of Access

- Validate an uploaded firmware images digital signature
- TLS Authentication

6.9 CSP Access Rights within Roles and Services

The CSPs are not accessible from any management interface.

7 Operational environment

The FIPS 140-2 Area 6 Operational Environment requirements are not applicable because the PTP 600 device does not contain a modifiable operational environment.

8 Security Rules

This section documents the security rules enforced by the cryptographic module to implement the security requirements of this FIPS 140-2 Level 2 module.

- The cryptographic module shall provide three roles. Security administrator, system administrator and read-only user.
- The cryptographic module shall provide identity based authentication.
- Concurrent operators support no bypass states; no maintenance roles
- The cryptographic module shall perform the power up self tests listed in Section 8.1.

8.1 Power up Self Tests

The operator shall be capable of commanding the module to perform the power-up self-test.

Data output shall be inhibited during key cryptographic self-tests, zeroisation, and error states.

Status information shall not contain CSPs or sensitive data that if misused could lead to a compromise of the module.

After FIPS configuration the module performs a reboot and subsequent FIPS self test.

The image will perform the following tests:

8.1.1 Cryptographic Self Tests

- SHA-1 known answer test
- DSA signature verification known answer test (power up & continuous)
- AES (FPGA used for wireless link encryption). Encryption and Decryption KAT
- AES (DSP TLS and SNMPv3). Encryption and Decryption KAT
- Triple-DES Encryption / Decrypt KAT
- DRBG. Known answer test (power up & continuous)
- HMAC-SHA-1. Known answer test
- RSA decrypt (power up & continuous)

8.1.2 Firmware Integrity Test (CRC32)

- A conditional firmware load test is performed before booting the FIPS module.
- The operator shall be capable of commanding the module to perform the power up self-test.
- Prior to each use, the internal DRBG shall be tested using the conditional test specified in FIPS 140-2 §4.9.2.
- Status information shall not contain CSPs or sensitive data that if misused could lead to a compromise of the module.
- A conditional DSA self test is performed before upgrading operational firmware
- A conditional DRBG test is performed before each random number generation

8.1.3 FIPS Integrity Test Error Indicators

All FIPS integrity test failures will result in a watchdog reset of the module. The integrity test failure messages are:

- FIPS Cryptographic Self Test Failure
- FIPS DRBG Failure
- FIPS RSA Decrypt Self Test Failure
- DSA Pair Wise Consistency FIPS Self Test Failure
- Bootcode Integrity Check Failure

9 Identification of FIPS Mode of Operation

- Correct configuration of the module can be confirmed by observing the FIPS 140-2 label on the webpage navigation frame and that the FIPS Operational Mode Alarm is not present in the Home page.

10 Physical Security Policy

The PTP 600 is a multi-chip standalone cryptographic module and includes the following physical security mechanisms:

- Production-grade components and production-grade opaque enclosure with tamper evident labels.
- Protected, opaque vent.

The tamper evident labels on the module enclosure must be checked every 30 days. If tamper evidence is observed, the module should be removed from service and inspected more closely.

10.1 FIPS Boundary and Frequency Variants

All frequency and bandwidth limited variants of the PTP 600 wireless products are encased using an identical cast metal casing and cover plate. The only exception to this is statement is the difference between connectorized and integrated wireless units which have differing types of cover plates.

11 Mitigation of Other Attacks Policy

No other attacks have been identified.