# FIPS 140-2 Security Policy

**For**

MOTOROLA

# Wireless Access Point AP-7131N-44040-FGR, AP-7131N-44040-FWW, AP-7131N-44040-FIL, AP-7131N-66040-FGR, AP-7131N-66040-FWW and AP-7131N-66040-FIL

**Document Version 1.7**

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# 1 Module Description

The Motorola AP-7131 Access Point is a standalone device that manages inbound and outbound traffic on the wireless network. It provides security, network services, intrusion detection and system management applications. It may be used together with the Motorola RF Switch and Motorola external IDS server.

The module is used to provide secure Wireless Local Area Network (WLAN) connectivity to a set of wireless client devices, as well as to provide Wireless Intrusion Detection Functionality. The module protects data exchanged with wireless client devices using IEEE 802.11i wireless security protocol, which provides data protection using the AES-CCM cryptographic algorithm.

For the purposes of FIPS 140-2 the module is classified as multi-chip standalone module.

FIPS 140-2 conformance testing of the module was performed at Security Level 2, except for Cryptographic Module Specification and Design Assurance sections of the FIPS 140-2 standard, which were tested as Security Level 3. The following configurations were tested:

| Module Name and Version | Firmware versions |
|---|---|
| AP-7131N-44040-FGR Access Point | AP7131N v4.0.0.0-035GR or<br>AP7131N v4.0.1.0-003GR |
| AP-7131N-44040-FWW Access Point | AP7131N v4.0.0.0-035GR or<br>AP7131N v4.0.1.0-003GR |
| AP-7131N-44040-FIL Access Point | AP7131N v4.0.0.0-035GR or<br>AP7131N v4.0.1.0-003GR |
| AP-7131N-66040-FGR Access Point | AP7131N v4.0.0.0-035GRN or<br>AP7131N v4.0.1.0-003GRN |
| AP-7131N-66040-FWW Access Point | AP7131N v4.0.0.0-035GRN or<br>AP7131N v4.0.1.0-003GRN |
| AP-7131N-66040-FIL Access Point | AP7131N v4.0.0.0-035GRN or<br>AP7131N v4.0.1.0-003GRN |

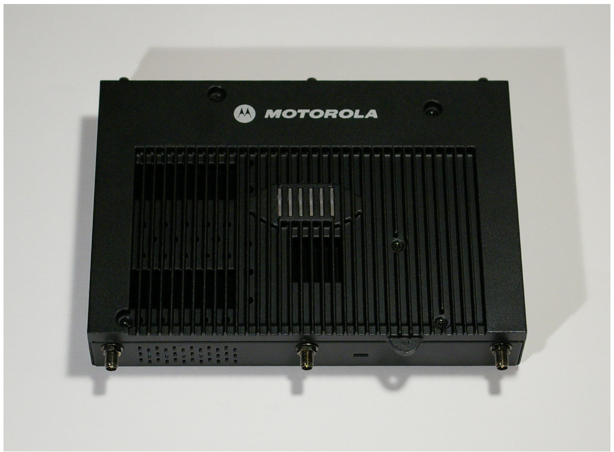
# 2 Cryptographic Boundary

The complete set of hardware and firmware components of the module is physically enclosed in a metal enclosure which serves as the cryptographic boundary of the module. The enclosure consists of the following two parts. The top panel can be removed from the bottom panel by unscrewing screws. The switch enclosure is opaque within the visible spectrum.

For tamper evidence the module requires tamper-evident labels to allow the detection of the opening of the top panel.

An image of the module is provided below:

Figure 1. An image of the module.



## 3 Ports and Interfaces

The module includes the following physical ports and logical interfaces.

| Port Name | Count | Interface(s) |
|---|---|---|
| Ethernet Port | 2 | Data Input, Data Output, Control Input, Status Output |
| Serial Console Port | 1 | Control Input, Status output, Data Output |
| LEDs | 6 | Status Output |
| Power Port | 1 | Power Input |
| Power Over Ethernet Port (included in the Ethernet connector) | 1 | Power Input |
| Reset Button | 1 | Control Input |
| Antenna Ports | 6 | Data Input/Output |

## 4 Roles, Services and Authentication

The module provides the following roles: a User role, a Crypto Officer role.

The Crypto Officers configure the module and manage its cryptographic functionality. Users employ the cryptographic services provided by the module.

The table below provides information on authentication mechanisms employed by each role.

| Role | Authentication Mechanism |
|---|---|
| User | Passwords are used for wireless connection with EAP-PEAP and EAP-TTLS authentication. The module uses passwords of at least 8 characters, therefore for each random authentication attempt the probability of success will be significantly less than one in 1,000,000. When a secure network connection is established, the possibility of randomly guessing a password in 60 seconds is less than 1 in 100,000 due to the password length and authentication process performance limitation.<br>Client Certificates are used for wireless connection with EAP-TLS authentication. The module uses client certificates with at least 1024 bit RSA key, which corresponds to 80 bits of security, therefore for each random authentication attempt the probability of success will be significantly less than one in 1,000,000. The possibility of randomly guessing a password in 60 seconds is less than 1 in 100,000 due to the authentication process performance limitation. |
| Crypto Officer | Passwords are used for connections via Command Line Interface (CLI), Web User Interface and SNMP management interface. The module uses passwords of at least 8 characters, therefore for each random authentication attempt the probability of success will be significantly less than one in 1,000,000. Upon a command line interface login attempt failure next username and password prompt is provided after 1 second interval. This ensures that a user can only make 60 or less consecutive attempts in a minute. Therefore the possibility of randomly guessing a password in 60 seconds is less than 1 in 100,000. |

The module provides the following services to the operators:

| Service | Role | Access to Cryptographic Keys and CSPs<br>R- read; W – write or generate; E-execute |
|---|---|---|
| Installation of the Module | Crypto Officer | Password: W<br>802.11i pre-shared key: W<br>SSH RSA key pair: W<br>TLS server certificate: W<br>TLS/EAP Certificate: W<br>SSH keys: E<br>ANSI X9.31 seed and key: E |

| **Service** | **Role** | **Access to Cryptographic Keys and CSPs**<br>**R- read; W – write or generate; E-execute** |
|---|---|---|
| Login | Crypto Officer | Password: E<br>SNMP secret: E<br>SSH Keys: E<br>TLS Keys: E<br>ANSI X9.31 seed and key: E |
| Run self-test | Crypto Officer | N/A |
| Show status | Crypto Officer | N/A |
| Reboot | Crypto Officer | N/A |
| Update firmware | Crypto Officer | Firmware load verification HMAC SHA-1 firmware load verification key: E |
| Zeroize/Restore factory settings | Crypto Officer | All keys: W |
| IPSec/VPN configuration | Crypto Officer | IPSec/IKE pre-shared key: W<br>SSH Keys: E<br>TLS Keys: E<br>ANSI X9.31 seed and key: E |
| Configure Secure IPSEC Connection to the Motorola WLAN switch | Crypto Officer | IPSec/IKE pre-shared key: W<br>SSH Keys: E<br>TLS Keys: E<br>ANSI X9.31 seed and key: E |
| Configure Secure IPSEC Connection to the External Authentication, Time and Audit Servers | Crypto Officer | IPSec/IKE pre-shared key: W<br>SSH Keys: E<br>TLS Keys: E<br>ANSI X9.31 seed and key: E |
| Wireless Security Protocol configuration (802.11i , EAP-TLS, EAP-TTLS, EAP-PEAP) | Crypto Officer | 802.11i pre-shared key: W<br>EAP-TTLS, PEAP passwords: W<br>EAP-TLS certificates: W<br>SSH Keys: E<br>TLS keys: E<br>ANSI X9.31 seed and key: E |
| View Wireless Intrusion Detection Logs | Crypto Officer | TLS keys: E<br>SSH Keys: E |
| Password protection configuration | Crypto Officer | Password: W<br>SNMP secret: W |

| **Service** | **Role** | **Access to Cryptographic Keys and CSPs**<br>**R- read; W – write or generate; E-execute** |
|---|---|---|
| Establishment of secure network connection | User | TLS keys: E<br>IPSec/IKE keys: E<br>TLS/EAP Certificate: E<br>802.11i keys: E<br>ANSI X9.31 seed and key: E |

# 5 Security Functions

The table below lists approved cryptographic algorithms employed by the module.

| Algorithm | Certificate Number |
|---|---|
| SHS | 1063, 1064 |
| HMAC | 652, 653 |
| Triple DES | 831, 832 |
| AES | 1147, 1148, 1149, 1150 |
| RSA | 543 |
| ANSI X9.31 PRNG | 635, 636 |

The table below lists non-Approved cryptographic algorithms employed by the module

| Algorithm | Usage |
|---|---|
| MD5 | Used by EAP-TLS, EAP_TTLS and EAP-PEAP protocols<br>Used during TLS handshake<br>Used by the SNMP protocol |
| HMAC-MD5 | Used by the SNMP protocol |
| DES | Used by the SNMP protocol |
| AES | Used by the SNMP protocol |
| SHS | Used by the SNMP protocol |
| Diffie-Hellman | Used for key establishment in TLS, IPSec/IKE, and SSH[1] handshake. Provides 80 bits of encryption strength. |
| RSA encrypt/decrypt | Used for key establishment in TLS handshake. Provides 80 bits of encryption strength. |

[1] SSH version 2 is used.

# 6 Key Management

The module uses ANSI X9.31 PRNG to generate random data.

The module provides a key zeroization command, which zeroizes all private and secret cryptographic keys and CSPs stored in flash memory. The command is followed by a reboot which zeroizes keys and CSPs stored in RAM.

The following cryptographic keys and CSPs are supported by the module.

| Name and type | Usage | Storage |
|---|---|---|
| TLS master secret | Used to derive TLS data encryption key and TLS HMAC key | Plaintext in RAM |
| TLS Triple-DES or AES encryption keys | Used to encrypt data in TLS protocol | Plaintext in RAM |
| TLS HMAC keys | Used to protect integrity of data in TLS protocol | Plaintext in RAM |
| TLS/EAP server RSA certificate (including the private key) | Used to encrypt the TLS master secret during the TLS handshake | Plaintext in RAM<br>Plaintext in flash |
| TLS and IPSec/IKE, and SSH Diffie-Hellman keys | Used for key establishment during the handshake | Plaintext in RAM |
| EAP-TLS Certification Authority RSA Certificate | Used to verify client certificate during the EAP-TLS handshake | Plaintext in RAM<br>Plaintext in flash |
| SSH RSA key pair | Used to authenticate the module to the SSH client during the SSH handshake | Plaintext in RAM<br>Plaintext in flash |
| SSH master secrets | Used to derive SSH encryption key and SSH HMAC key | Plaintext in RAM |
| SSH Triple-DES or AES encryption keys | Used to encrypt SSH data | Plaintext in RAM |
| SSH HMAC keys | Used to protect integrity of SSH data | Plaintext in RAM |
| IPSec/IKE pre-shared key | Used to derive IPSec/IKE encryption keys and IPSec/IKE HMAC keys | Plaintext in RAM<br>Plaintext in flash |
| IPSec/IKE Triple-DES or AES encryption keys | Used to encrypt IPSec/IKE data | Plaintext in RAM |
| IPSec/IKE HMAC keys | Used to protect integrity of IPSec/IKE data | Plaintext in RAM |

| Name and type | Usage | Storage |
|---|---|---|
| ANSI X9.31 PRNG1 Seed and Seed Key | Used to initialize the PRNG to a random state | Plaintext in RAM |
| ANSI X9.31 PRNG2 Seed and Seed Key | Used to initialize the PRNG to a random state | Plaintext in RAM |
| 802.11i AES-CCM Temporal Key | Used to secure unicast wireless data | Plaintext in RAM |
| 802.11i AES-CCM Group Temporal Key | Used to secure multicast wireless data | Plaintext in RAM |
| 802.11i pre-shared key | Used to derive 802.11i Temporal Key and 802.11i Group Temporal Key | Plaintext in RAM<br>Plaintext in flash |
| Firmware load verification HMAC SHA-1 Key | Used to verify firmware components | Plaintext in RAM<br>Plaintext in flash |
| Passwords | Used to authenticate users | Plaintext in RAM<br>Plaintext in flash |
| SNMP secret | Used to authenticate Crypto Officers accessing SNMP management interface | Plaintext in RAM<br>Plaintext in flash |
| IDS Server RSA Public Key and RSA Client Certificate | Used to establish TLS 1.0 connection to the external IDS server | Plaintext in RAM<br>Plaintext in flash |

# 7 Self Tests

The module runs a set of self-tests on power-up. If one of the self-tests fails, the module transitions into an error state where all data output and cryptographic operations are disabled.

The module runs power-up self-tests for the following algorithms:

| Algorithm | Test |
|---|---|
| **Firmware integrity** | **Firmware integrity test using SHA-1** |
| For each AES implementation | Known Answer Test |
| For each TDES implementation | Known Answer Test |
| For each SHS implementation | Known Answer Test |
| For each HMAC implementation | Known Answer Test |
| For each ANSI X9.31 PRNG implementation | Known Answer Test |
| RSA | Pairwise Consistency Check (Sign/Verify) |

During the module operation the following conditional self-tests are performed:

| Condition | Test |
|---|---|
| Random Number Generation | Continuous PRNG Test |

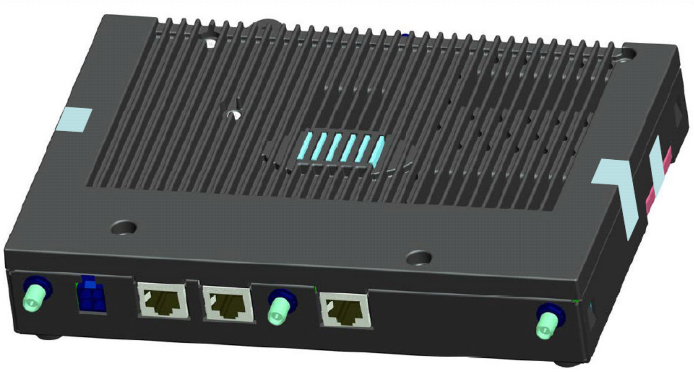
| Condition | Test |
|---|---|
| Firmware Load | Firmware Load Test |
| RSA Key Pair generation | Pairwise Consistency Check (Sign/Verify, Encrypt/Decrypt) |
| Bypass | Bypass Test |

# 8 Physical Security

The module consists of production-grade components enclosed in a metal enclosure. The enclosure is opaque within the visible spectrum. The top panel of the enclosure can be removed by unscrewing screws.

The module is protected by three tamper evident labels in accordance with FIPS 140-2 Level 2 Physical Security requirements. The three tamper evident labels are applied over the panels and sides of the module at the factory to provide evidence of tampering.

An image of the module with tamper evident labels applied is provided below:



# 9 Secure Operation

## 9.1 Approved Mode of Operation

The module always operates in the Approved Mode of Operation and does not support a non-Approved mode of Operation. The following message is output to the command line interface and the Web User Interface: "This Device Is Running In FIPS Mode". Module documentation provides detailed guidance for the module users and Crypto Officers.

The Crypto Officer periodically inspects the module and the tamper evident labels. If an evidence of tampering is detected, the Crypto Officer shall immediately disable the module and notify the management.

Module users and Crypto Officers shall keep all authentication data confidential and shall not allow access to the module to unauthorized persons.

When the module is received from the factory, it includes default Crypto Officer username/password. The Crypto Officer shall connect to the module using the serial interface and change the password to the non-default value before letting other users to operate the module.