

# FIPS 140-2 Non-Proprietary Security Policy for the Cisco Unified IP Phone 6901 and 6911

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## Introduction

This is a non-proprietary Cryptographic Module Security Policy for the Cisco Unified IP Phone 6901 and 6911. This policy describes how the Cisco Unified IP Phone 6901 and 6911 meet the requirements of FIPS 140-2. This document also includes instructions for configuring the phones in FIPS mode.

This policy was prepared as part of the Level 1 FIPS 140-2 validation for the Cisco Unified IP Phone 6901 and 6911.

FIPS 140-2 (Federal Information Processing Standards Publication 140-2 — Security Requirements for Cryptographic Modules) details the U.S. Government requirements for cryptographic modules. More information about the FIPS 140-2 standard and validation program is available on the NIST website at <http://csrc.nist.gov/groups/STM/index.html>.

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This document includes the following sections:

- FIPS 140-2 Submission Package
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- Roles and Services
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## FIPS 140-2 Submission Package

The security policy document is one document in a FIPS 140-2 Submission Package. In addition to this document, the complete submission package contains:

- Vendor Evidence
- Finite State Machine
- Other supporting documentation as additional references

With the exception of this non-proprietary security policy, the FIPS 140-2 validation documentation is proprietary to Cisco Systems, Inc. and is releasable only under appropriate non-disclosure agreements. For access to these documents, please contact Cisco Systems, Inc. See Obtaining Technical Assistance for more information.

## Overview

Today, more organizations can take advantage of Cisco Unified Communications, thanks to these affordable IP endpoints. The Cisco Unified IP Phones 6901 and 6911 deliver cost-effective, full-featured voice communication services in a clutter-free and earth-friendly, ergonomic design. Cisco Unified IP Phones 6901 and 6911 endpoints are earth-friendly. They are made with recyclable and reground plastics, so they are earth-responsible solutions. A deep-sleep power option, on select models, reduces power consumption by up to 50 percent in off-work hours, a feature that is good for your company's profitability and good for the planet too.

The Data Sheet for the 6901 can be found on the Cisco website at <http://goo.gl/MtGAI>



Figure 1 - The Cisco Unified IP Phone 6901

The Data Sheet for the 6911 can be found on the Cisco website at <http://goo.gl/NBCIG>



Figure 2 - The Cisco Unified IP Phone 6911

## Cryptographic Module Validation Level

Validation Level by Section lists the level of validation for each area in the FIPS PUB 140-2.

**Table 1 Validation Level by Section**

No.	Area Title	Level
1	Cryptographic Module Specification	1
2	Cryptographic Module Ports and Interfaces	1
3	Roles, Services, and Authentication	1
4	Finite State Model	1
5	Physical Security	1
6	Operational Environment	N/A
7	Cryptographic Key management	1
8	Electromagnetic Interface/Electromagnetic Compatibility	1
9	Self-Tests	1
10	Design Assurance	1
11	Mitigation of Other Attacks	N/A

## Physical Characteristics and Phone Interfaces

The logical interfaces and their mapping for the 6901 and 6911 phones are described in [Tables 2 and 3](#):

**Table 2 Cisco 6901 Physical Interface/Logical Interface Mapping**

Physical Interface	FIPS 140-2 Logical Interface
Phone Keypad, Data Port, Phone Microphone,	Data Input
Phone Speaker, Data Port	Data Output
Phone Keypad, Data Port, Power Port	Control Input
Phone Speaker, message waiting light, LEDs	Status Output

**Table 3 Cisco 6911 Physical Interface/Logical Interface Mapping**

Physical Interface	FIPS 140-2 Logical Interface
Keypad, Data Port, Microphone	Data Input
Speaker, Data Port	Data Output
Keypad, Data Port, Power Port	Control Input
Phone Speaker, message waiting light, LEDs	Status Output

# Roles and Services

As required by FIPS 140-2, there are two main roles in the 6901 and 6911 phones that operators may assume: a Crypto Officer role and User role. The respective services for each role are described in the Crypto Officer Services, and the User Services.

## Crypto Officer Services

The Crypto Officer role is responsible for the configuration and maintenance of the phones. For the purposes of this testing, the Crypto Officer will be defined as the operations and processes performed by the Cisco Unified Call Manager (CUCM). The authentication mechanism associated with the Crypto-Officer has not been tested as part of this FIPS level one validation. The Crypto Officer services consist of the following:

- Establish TLS sessions for configuration
- Perform configuration of the phone
- Transport Keys to the phone
- View Status of the phone
- Restart the phone (Restart the connection between the phone and CUCM)
- Reset the phone
- Initiate Self-tests by rebooting the phone.

## User Services

A user initializes the phone by turning it on. There is no explicit login interface for the phone, as level 1 allows for implicit role assumption. Some services may require the menu key to access the features. The services available to the User role consist of the following:

- Make and Receive Calls (Encrypt/Decrypt data)
- Run Self-Tests
- Customize keypad parameters
- Edit network profile parameters (SSID, DHCP Server, TFTP Server, etc.)
- Edit system configuration
- Edit device information (CallManager, Network, HTTP, Locale, QoS, and UI information)

# Cryptographic Key Management

The phones use a variety of Critical Security Parameters during operation.

Table 4 lists the cryptographic keys used by the 6901 and 6911 phones.

**Table 4 Secret and Private Cryptographic Keys Used by the 6901 and 6911 phones**

#	Key/CSP Name	Generation/ Algorithm	Description	Storage	Zeroization
1	Configuration File AES-128 Key	Generated by the CUCM	Key used to decrypt the configuration file once it is on the phone	Stored in volatile memory	Power Cycle or Device Reset
2	sRTP Master Key (AES)	Generated by the CUCM and sent to phone in TLS session	Key used to generate sRTP session keys	Stored in volatile memory	upon end of call or device reset.
3	sRTP Encryption key (AES)	Generated via the sRTP protocol	Key used to encrypt/decrypt sRTP packets	Stored in volatile memory	upon end of call or device reset.
4	sRTP Authentication key (HMAC)	Generated via the sRTP protocol	Key used to authenticate sRTP packets	Stored in volatile memory	upon end of call or device reset.
5	CUCM TLS Session Encryption key (AES)	Generated via the TLS Protocol	TLS sessions keys based on the Locally Significant Certificate (LSC) for derivation	Stored in volatile memory	upon end of call or device reset.
6	CUCM TLS Session Authentication key (HMAC)	Generated via the TLS Protocol	TLS sessions keys based on the LSC for derivation	Stored in volatile memory	upon end of call or device reset.
7	Webserver TLS Session Encryption key (AES/TDES)	Generated via the TLS Protocol	TLS sessions keys based on the LSC for derivation	Stored in volatile memory	upon end of call or device reset
8	Webserver TLS Session Authentication key (HMAC)	Generated via the TLS Protocol	TLS sessions keys based on the LSC for derivation	Stored in volatile memory	upon end of call or device reset.
9	RNG Seed Key	Multiple data bytes (16-bytes) retrieved from a 32-bytes Hardware based entropy source (time, clock, thermal noise, interrupts, and	Seed Key used to randomize the initialization of the RNG	Stored in volatile memory	Reset or loss of power

		memory, etc).			
10	RNG Seed	Multiple data bytes (16-bytes) retrieved from a 32-bytes Hardware based entropy source (time, clock, thermal noise, interrupts, and memory, etc).	Seed used to randomize the initialization of the RNG	Stored in volatile memory	Reset or loss of power
11	LSC Private Key (RSA)	Generated by the module but converted into a certificate by the CAPF/CUCM (Note that the RSA keys generated must be at least a 1024 bit key)	Private key for locally issued certificates. Used for TLS negotiation with CUCM and Web Clients	/ flash0/sec/lsc0/phone Key.pvt	Zeroized by resetting phone to default settings

The services accessing the Critical Service Parameters (CSP)s, the type of access and which role accesses the CSPs are listed in Table 5.

**Table 5 Cisco 6901 and 6911 phones Validation Level by Section**

CSP/Role/Service Access Policy	Critical Security Parameter	CSP 1	CSP 2	CSP 3	CSP 4	CSP 5	CSP 6	CSP 7	CSP 8	CSP 9	CSP 10	CSP 11
	Role/Service											
User Role												
Make and Receive Calls												
Run Self-Tests												

Customize Sound and keypad parameters												
Edit Network Profile Parameters												
Edit System Configuration												
Edit Device information												
Crypto-Officer Role												
Establish TLS sessions for configuration		rw d	rw d	rw d	rw d	rw d	rw d	rw d	rw d	rw d	rw d	rw d
Perform configuration of the phone		rw d	rw d	rw d	rw d	rw d	rw d	rw d	rw d	rw d	rw d	rw d
Transport Keys to the phone		rw d	rw d	rw d	rw d	rw d	rw d	rw d	rw d	rw d	rw d	rw d
View Status of the phone		r	r	r	r	r	r	r	r	r	r	r
Reboot the phone		d	d	d	d	d	d	d	d	d	d	
Reset the phone		d	d	d	d	d	d	d	d	d	d	d
Initiate Self-tests		d	d	d	d	d	d	d	d	d	d	

r = read w = write d = delete

## Self-Tests

The 6901 and 6911 Phones include an array of self-tests that are run during startup and periodically during operations to prevent any secure data from being released and to ensure all components are functioning correctly.

**Table 6 6901 and 6911 Power-On Self-Tests**



<b>Implementation</b>	<b>Tests Performed</b>
TI DSP Library	<ul style="list-style-type: none"> <li>• AES KAT</li> <li>• HMAC SHA-1 KAT</li> </ul>
OpenSSL 0.9.8K	<ul style="list-style-type: none"> <li>• RSA KAT (signature/verification)</li> <li>• AES KAT</li> <li>• Triple-DES KAT</li> <li>• HMAC SHA-1 KAT</li> <li>• RNG KAT</li> </ul>
Module Firmware	<ul style="list-style-type: none"> <li>• Firmware Integrity Test</li> </ul>

The phone performs all power-on self-tests automatically at boot when FIPS mode is enabled. The power-on self-tests are performed after the cryptographic systems are initialized, and in the unlikely event that a power-on self-test fails, the module transitions into an error state and displays an error message via its status output interface.

Table 7 lists the conditional self-tests that the 6901 and 6911 phones perform.

**Table 7 6901 and 6911 Conditional Self-Tests**

<b>Implementation</b>	<b>Tests Performed</b>
TI DSP Library	<ul style="list-style-type: none"> <li>• Conditional Bypass test</li> </ul>
OpenSSL 0.9.8K	<ul style="list-style-type: none"> <li>• Pairwise consistency test for RSA</li> <li>• Continuous Random Number Generator Test for the FIPS-approved RNG</li> </ul>

## Mitigation of Other Attacks

The 6901 and 6911 do not claim to mitigate any attacks in a FIPS-approved mode of operation.

## Secure Operation

The Cisco 6901 and 6911 phones meet FIPS 140-2 Level 1 requirements. This section describes how to place and keep a phone in a FIPS-approved mode of operation. Operating the phone without maintaining the following settings will remove the phone from the FIPS-approved mode of operation.

## Crypto Officer Guidance – System Initialization

The Crypto Officer must create a device security profile in Call manager. Below, find instructions on creating the device security profile.

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1. Login to Call Manager
  2. Navigate to System -> Security Profile -> Phone Security Profile.
  3. Click the Add New button
  4. Select “Cisco 6901” or “Cisco 6911” from the drop down box and click next.
  5. From the Drop down box, select SCCP for the security protocol profile and click next.
  6. In the Name box, give an appropriate name such as “Cisco 6901 FIPS Security Profile”, or “Cisco 6911 FIPS Security Profile”, followed by an appropriate description.
  7. In the section titled, “Phone Security Profile CAPF Information, Select the “Authentication Mode” to be “By Existing Certificate (Precedence to LSC), and select the key size to be 2048 bits.
  8. While still in the “Phone Security Profile CAPF Information”, select the device security mode to “encrypted”
  9. Click “Save”

## Crypto Officer Guidance – System Configuration

The Cisco 6901 and 6911 phones were validated with software version 9.2.1(cmterm-6901\_6911-sccp.9-2-1-a.cop.sgn) This is the only allowable image for the FIPS-approved mode of operation, and once installed, the operator must not upgrade or change the firmware.

The Crypto Officer must configure and enforce the following initialization steps:

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### Login to Call Manager

- Navigate to phone page
- Select the 6901 or 6911 in the list of phones
- Click on the phone in question to navigate to the configuration page.
- Find the section titled “Product Specific Configuration Layout” and make sure that both web access and SSH are disabled
- Find the section titled “Protocol Specific Information” and select the device security profile that you created in the previous section above.
- At the bottom of the list of configuration items, select to enable FIPS mode.
- Save the configurations by clicking on save.
- Reset the phone by clicking reset

## Approved Cryptographic Algorithms

The Cisco 6901 and 6911 phones support many different cryptographic algorithms; however, when configured for FIPS compliant operation (by following the instructions of this section), the module will only utilize FIPS-approved and FIPS allowed cryptographic algorithms. Table 8 lists all FIPS approved algorithms supported by the module

**Table 9**                      **6901 and 6911 Algorithm Certificates**

<b>Algorithm</b>	<b>TI DSP Library</b>	<b>OpenSSL Library</b>
AES	1748	1746
Triple-DES	N/A	1131
SHA-1	1535	1533
HMAC SHA-1	1025	1023
RNG	N/A	930
RSA	N/A	867

## Non-FIPS Approved Algorithms

The 6901 and 6911 implement the following non-FIPS-approved cryptographic algorithms:

- MD5
- MD5 HMAC
- RSA (allowed in FIPS mode for key transport) (key wrapping; key establishment methodology provides 80 or 112 bits of encryption strength)

## Related Documentation

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

- The NIST Cryptographic Module Validation Program website (<http://csrc.nist.gov/cryptval/>) contains contact information for answers to technical or sales-related questions for the 6901 and 6911 phones.

## Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

## Cisco.com

You can access the most current Cisco documentation at this URL:

<http://www.cisco.com/techsupport>

You can access the Cisco website at this URL:

<http://www.cisco.com>

You can access international Cisco websites at this URL:

[http://www.cisco.com/public/countries\\_languages.shtml](http://www.cisco.com/public/countries_languages.shtml)

## Product Documentation DVD

Cisco documentation and additional literature are available in the Product Documentation DVD package, which may have shipped with your product. The Product Documentation DVD is updated regularly and may be more current than printed documentation.

The Product Documentation DVD is a comprehensive library of technical product documentation on portable media. The DVD enables you to access multiple versions of hardware and software installation, configuration, and command guides for Cisco products and to view technical documentation in HTML. With the DVD, you have access to the same documentation that is found on the Cisco website without being connected to the Internet. Certain products also have .pdf versions of the documentation available.

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<http://www.cisco.com/go/marketplace/>

## Ordering Documentation

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<http://www.cisco.com/go/marketplace/>

Nonregistered Cisco.com users can order technical documentation from 8:00 a.m. to 5:00 p.m. (0800 to 1700) PDT by calling 1 866 463-3487 in the United States and Canada, or elsewhere by calling 011 408 519-5055. You can also order documentation by e-mail at [tech-doc-store-mkpl@external.cisco.com](mailto:tech-doc-store-mkpl@external.cisco.com) or by fax at 1 408 519-5001 in the United States and Canada, or elsewhere at 011 408 519-5001.

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Cisco Systems  
Attn: Customer Document Ordering  
170 West Tasman Drive  
San Jose, CA 95134-9883

We appreciate your comments.

## Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

[http://www.cisco.com/en/US/products/products\\_security\\_vulnerability\\_policy.html](http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html)

From this site, you can perform these tasks:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

<http://www.cisco.com/go/psirt>

If you prefer to see advisories and notices as they are updated in real time, you can access a Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed from this URL:

[http://www.cisco.com/en/US/products/products\\_psirt\\_rss\\_feed.html](http://www.cisco.com/en/US/products/products_psirt_rss_feed.html)

## Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

- Emergencies — [security-alert@cisco.com](mailto:security-alert@cisco.com)

An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.

- Nonemergencies — [psirt@cisco.com](mailto:psirt@cisco.com)

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

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**Tip** We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.x through 8.x.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

[http://www.cisco.com/en/US/products/products\\_security\\_vulnerability\\_policy.html](http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html)

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The link on this page has the current PGP key ID in use.

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<http://www.cisco.com/techsupport>

Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>

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**Note** Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support & Documentation website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

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## Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

## Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

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or view the digital edition at this URL:  
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- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:  
<http://www.cisco.com/ipj>
- Networking products offered by Cisco Systems, as well as customer support services, can be obtained at this URL:  
<http://www.cisco.com/en/US/products/index.html>
- Networking Professionals Connection is an interactive website for networking professionals to share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:  
<http://www.cisco.com/discuss/networking>
- World-class networking training is available from Cisco. You can view current offerings at this URL:  
<http://www.cisco.com/en/US/learning/index.html>

## Definition List

AES—Advanced Encryption Standard  
 CMVP—Cryptographic Module Validation Program  
 CUCM—Cisco Unified Call Manager  
 CSP—Critical Security Parameter  
 DES—Data Encryption Standard  
 FIPS—Federal Information Processing Standard  
 HMAC—Hash Message Authentication Code  
 HTTP—Hyper Text Transfer Protocol  
 KAT—Known Answer Test  
 LED—Light Emitting Diode  
 MAC—Message Authentication Code  
 NIST—National Institute of Standards and Technology  
 NVRAM—Non-Volatile Random Access Memory  
 OSCP—Online Certificate Status Protocol  
 RAM—Random Access Memory  
 RNG—Random Number Generator  
 RSA—Rivest Shamir and Adleman method for asymmetric encryption  
 SHA—Secure Hash Algorithm  
 SSL—Secure Sockets Layer  
 Triple-DES—Triple Data Encryption Standard  
 TLS—Transport Layer Security  
 VOIP - Voice over IP Protocol



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This document is to be used in conjunction with the documents listed in the [“Related Documentation”](#) section.

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