



PKCS #11 Cryptographic Token Interface Profiles Version 3.0

OASIS Standard

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This prose specification is one component of a Work Product that also includes:

- PKCS #11 header files:
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- **ALERT:** Due to a clerical error when publishing the Committee Specification, the header files listed above are outdated and may contain serious flaws. The TC is addressing this in the next round of edits. Meanwhile, users of the standard can find the correct header files at <https://github.com/oasis-tcs/pkcs11/tree/master/working/3-00-current>.

Related work:

This specification replaces or supersedes:

- *PKCS #11 Cryptographic Token Interface Profiles Version 2.40*. Edited by Tim Hudson. Latest stage. <http://docs.oasis-open.org/pkcs11/pkcs11-profiles/v2.40/pkcs11-profiles-v2.40.html>.

This specification is related to:

- *PKCS #11 Cryptographic Token Interface Base Specification Version 3.0*. Edited by Chris Zimman and Dieter Bong. Latest stage. <https://docs.oasis-open.org/pkcs11/pkcs11-base/v3.0/pkcs11-base-v3.0.html>.
- *PKCS #11 Cryptographic Token Interface Current Mechanisms Specification Version 3.0*. Edited by Chris Zimman and Dieter Bong. Latest stage. <https://docs.oasis-open.org/pkcs11/pkcs11-curr/v3.0/pkcs11-curr-v3.0.html>.

- *PKCS #11 Cryptographic Token Interface Historical Mechanisms Specification Version 3.0*. Edited by Chris Zimman and Dieter Bong. Latest stage. <https://docs.oasis-open.org/pkcs11/pkcs11-hist/v3.0/pkcs11-hist-v3.0.html>.

Abstract:

This document is intended for developers and architects who wish to design systems and applications that conform to the PKCS #11 Cryptographic Token Interface standard.

The PKCS #11 Cryptographic Token Interface standard documents an API for devices that may hold cryptographic information and may perform cryptographic functions.

Status:

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1 Introduction

This document intends to meet this OASIS requirement on conformance clauses for providers and consumers of cryptographic services via PKCS#11 ([PKCS11-Base] Section 6 - PKCS#11 Implementation Conformance) through profiles that define the use of PKCS#11 data types, objects, functions and mechanisms within specific contexts of provider and consumer interaction. These profiles define a set of normative constraints for employing PKCS#11 within a particular environment or context of use. They may, optionally, require the use of specific PKCS#11 functionality or in other respects define the processing rules to be followed by profile actors.

For normative definition of the elements of PKCS#11 specified in these profiles, see the [PKCS#11 Cryptographic Token Interface Base Specification](#) ([PKCS11-Base]) and the [PKCS#11 Cryptographic Token Interface Current Mechanisms](#) ([PKCS11-Curr]). Illustrative guidance for the implementation of providers and consumers of PKCS#11 is provided in the [PKCS#11 Cryptographic Token Interface Usage Guide](#) ([PKCS11-UG]).

1.1 IPR Policy

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1.2 Terminology

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [\[RFC2119\]](#).

1.3 Normative References

- [PKCS11-Base]** *PKCS #11 Cryptographic Token Interface Base Specification Version 3.0*. Edited by Chris Zimman and Dieter Bong. Latest stage. <https://docs.oasis-open.org/pkcs11/pkcs11-base/v3.0/pkcs11-base-v3.0.html>.
- [PKCS11-Curr]** *PKCS #11 Cryptographic Token Interface Current Mechanisms Specification Version 3.0*. Edited by Chris Zimman and Dieter Bong. Latest stage. <https://docs.oasis-open.org/pkcs11/pkcs11-curr/v3.0/pkcs11-curr-v3.0.html>.
- [PKCS11-Hist]** *PKCS #11 Cryptographic Token Interface Historical Mechanisms Specification Version 3.0*. Edited by Chris Zimman and Dieter Bong. Latest stage. <https://docs.oasis-open.org/pkcs11/pkcs11-hist/v3.0/pkcs11-hist-v3.0.html>.
- [RFC2119]** Bradner, S., “Key words for use in RFCs to Indicate Requirement Levels”, BCP 14, RFC 2119, March 1997. <http://www.ietf.org/rfc/rfc2119.txt>.

1.4 Non-Normative References

- [PKCS11-UG]** *PKCS #11 Cryptographic Token Interface Usage Guide Version 3.0*. Work in progress.

2 Profiles

2.1 PKCS #11 Profiles

This document defines a selected set of conformance clauses which form PKCS #11 Profiles. The PKCS 11 TC also welcomes proposals for new profiles. PKCS 11 TC members are encouraged to submit these proposals to the PKCS 11 TC for consideration for inclusion in a future version of this TC-approved document. However, some OASIS members MAY simply wish to inform the committee of profiles or other work related to PKCS #11.

2.2 Guidelines for Specifying Conformance Clauses

This section provides a checklist of issues that SHALL be addressed by each clause.

1. Implement functionality as mandated by **[PKCS11-Base] Section 6** (PKCS#11 Implementation Conformance)
2. Specify the list of additional data types that SHALL be supported
3. Specify the list of additional attributes that SHALL be supported
4. Specify the list of additional objects that SHALL be supported
5. Specify the list of additional functions that SHALL be supported
6. Specify the list of additional mechanisms that SHALL be supported

2.3 Guidelines for Validating Conformance to PKCS #11 Profiles

A PKCS #11 provider implementation SHALL claim conformance to a specific provider profile only if it instruments all required data types, attributes, objects, functions and mechanisms of that profile

- All data types specified as required in that profile
- All attributes specified as required in that profile
- All objects specified as required in that profile
- All functions specified as required in that profile
- All mechanisms specified as required in that profile

A PKCS #11 consumer implementation SHALL claim conformance to a specific consumer profile only if it instruments all required data types, attributes, objects, functions and mechanisms of that profile

- All data types specified as required in that profile
- All attributes specified as required in that profile
- All objects specified as required in that profile
- All functions specified as required in that profile
- All mechanisms specified as required in that profile

Note: items may be specified either directly in a profile or by reference to other profiles. Where another profile is referenced as required, the combination of the requirements of all referenced required profiles (directly or indirectly) SHALL apply.

2.4 Defined Profile Identifiers

Profile objects (object class CKO_PROFILE) describe which PKCS #11 profiles the token implements.

The **CKA_PROFILE** attribute identifies a profile that the token implements.

Attribute	Data type	Meaning
CKA_PROFILE_ID	CK_PROFILE_ID	ID of the supported profile.

The following table defines the **CK_PROFILE_ID** values:

Constant	Meaning
CKP_INVALID_ID	Invalid profile
CKP_BASELINE_PROVIDER	Baseline Provider
CKP_EXTENDED_PROVIDER	Extended Provider
CKP_AUTHENTICATION_TOKEN	Authentication Token
CKP_PUBLIC_CERTIFICATES_TOKEN	Public Certificates Token
CKP_VENDOR_DEFINED	Vendor defined

3 Conformance

3.1 Purpose of this Section

The following subsections describe currently-defined profiles related to the use of PKCS #11. The profiles define classes of PKCS #11 functionality to which an implementation can declare conformance.

3.2 Baseline Consumer Clause

A PKCS #11 consumer calls a PKCS #11 provider implementation of the PKCS #11 API in order to use the cryptographic functionality from that provider.

This profile specifies the most basic functionality that would be expected of a conformant PKCS #11 consumer – the ability to consume information via the cryptographic services offered by a provider.

3.2.1 Implementation Conformance

An implementation is a conforming Baseline Consumer Clause if it meets the conditions as outlined in the following section.

3.2.2 Conformance of a PKCS #11 Baseline Consumer

An implementation conforms to this specification as a Baseline Consumer if it meets the following conditions:

1. Supports the conditions required by the PKCS #11 conformance clauses ([PKCS11-Base] Section 6 (PKCS#11 Implementation Conformance))
2. Supports the following data types:
 - a. CK_VERSION ([PKCS11-Base] 3.1)
 - b. CK_INFO ([PKCS11-Base] 3.1)
 - c. CK_SLOT_ID ([PKCS11-Base] 3.2)
 - d. CK_SLOT_INFO ([PKCS11-Base] 3.2)
 - e. CK_TOKEN_INFO ([PKCS11-Base] 3.2)
 - f. CK_SESSION_HANDLE ([PKCS11-Base] 3.3)
 - g. CK_USER_TYPE ([PKCS11-Base] 3.3)
 - h. CK_SESSION_INFO ([PKCS11-Base] 3.3)
 - i. CK_OBJECT_HANDLE ([PKCS11-Base] 3.4)
 - j. CK_OBJECT_CLASS ([PKCS11-Base] 3.4)
 - k. CK_ATTRIBUTE_TYPE ([PKCS11-Base] 3.4)
 - l. CK_ATTRIBUTE ([PKCS11-Base] 3.4)
 - m. CK_RV ([PKCS11-Base] 3.6)
 - n. CK_FUNCTION_LIST ([PKCS11-Base] 3.6)
 - o. CK_C_INITIALIZE_ARGS ([PKCS11-Base] 3.7)
3. Supports the following attributes:
 - a. CKA_CLASS ([PKCS11-Base] 4.2)
 - b. CKA_VALUE ([PKCS11-Base])
4. Supports the following objects:
 - a. None specified
5. Supports the following functions:
 - a. C_GetFunctionList ([PKCS11-Base] 5.4)
 - b. C_Initialize ([PKCS11-Base] 5.4)
 - c. C_Finalize ([PKCS11-Base] 5.4)
 - d. C_GetInfo ([PKCS11-Base] 5.4)
 - e. C_GetSlotList ([PKCS11-Base] 5.5)

- f. C_GetSlotInfo ([PKCS11-Base] 5.5)
 - g. C_GetTokenInfo ([PKCS11-Base] 5.5)
 - h. C_OpenSession ([PKCS11-Base] 5.6)
 - i. C_CloseSession ([PKCS11-Base] 5.6)
6. Supports the following mechanisms:
 - a. None specified
 7. Supports Error Handling ([PKCS11-Base] 5.1) for any supported object, function or mechanism
 8. Optionally supports any clause within [PKCS11-Base] that is not listed above
 9. Optionally supports extensions outside the scope of this standard (e.g., vendor defined extensions, conformance clauses) that do not contradict any PKCS #11 requirements

3.3 Baseline Provider Clause

A PKCS #11 provider makes cryptographic functionality available to a consuming application in terms of the PKCS #11 API.

This profile specifies the most basic functionality that would be expected of a conformant PKCS #11 provider – the ability to provide information about the capabilities of the cryptographic services provided.

3.3.1 Implementation Conformance

An implementation is a conforming Baseline Provider if it meets the conditions as outlined in the following section.

3.3.2 Conformance of a PKCS #11 Baseline Provider

An implementation conforms to this specification as a Baseline Provider if it meets the following conditions:

1. Supports the conditions required by the PKCS #11 conformance clauses ([PKCS11-Base] Section 6 (PKCS#11 Implementation Conformance))
2. Supports the following data types:
 - a. CK_VERSION ([PKCS11-Base] 3.1)
 - b. CK_INFO ([PKCS11-Base] 3.1)
 - c. CK_SLOT_ID ([PKCS11-Base] 3.2)
 - d. CK_SLOT_INFO ([PKCS11-Base] 3.2)
 - e. CK_TOKEN_INFO ([PKCS11-Base] 3.2)
 - f. CK_SESSION_HANDLE ([PKCS11-Base] 3.3)
 - g. CK_USER_TYPE ([PKCS11-Base] 3.3)
 - h. CK_SESSION_INFO ([PKCS11-Base] 3.3)
 - i. CK_OBJECT_HANDLE ([PKCS11-Base] 3.4)
 - j. CK_OBJECT_CLASS ([PKCS11-Base] 3.4)
 - k. CK_ATTRIBUTE_TYPE ([PKCS11-Base] 3.4)
 - l. CK_ATTRIBUTE ([PKCS11-Base] 3.4)
 - m. CK_PROFILE_ID ([PKCS11-Base] 3.4)
 - n. CK_RV ([PKCS11-Base] 3.6)
 - o. CK_FUNCTION_LIST ([PKCS11-Base] 3.6)
 - p. CK_INTERFACE ([PKCS11-Base] 3.6)
 - q. CK_C_INITIALIZE_ARGS ([PKCS11-Base] 3.7)
3. Supports the following attributes:
 - a. CKA_CLASS ([PKCS11-Base] 4.2)
 - b. CKA_TOKEN ([PKCS11-Base] 4.2)
 - c. CKA_VALUE ([PKCS11-Base])
 - d. CKA_ID ([PKCS11-Base])
 - e. CKA_PRIVATE ([PKCS11-Base] 4.4)
 - f. CKA_MODIFIABLE ([PKCS11-Base])

- g. CKA_LABEL ([PKCS11-Base])
 - h. CKA_UNIQUE_IDENTIFIER ([PKCS11-Base] 4.4)
 - i. CKA_PROFILE_ID ([PKCS11-Base] 4.13)
4. Supports the following objects:
 - a. CKO_PROFILE ([PKCS11-Base] 4.13) with value CKP_BASELINE_PROVIDER
 5. Supports the following functions:
 - a. C_GetFunctionList ([PKCS11-Base] 5.4)
 - b. C_GetInterfaceList ([PKCS11-Base] 5.4)
 - c. C_GetInterface ([PKCS11-Base] 5.4)
 - d. C_Initialize ([PKCS11-Base] 5.4)
 - e. C_Finalize ([PKCS11-Base] 5.4)
 - f. C_GetInfo ([PKCS11-Base] 5.4)
 - g. C_GetSlotList ([PKCS11-Base] 5.5)
 - h. C_GetSlotInfo ([PKCS11-Base] 5.5)
 - i. C_GetTokenInfo ([PKCS11-Base] 5.5)
 - j. C_OpenSession ([PKCS11-Base] 5.6)
 - k. C_CloseSession ([PKCS11-Base] 5.6)
 - l. C_GetSessionInfo ([PKCS11-Base] 5.6)
 - m. C_FindObjectsInit ([PKCS11-Base] 5.6)
 - n. C_FindObjects ([PKCS11-Base] 5.6)
 - o. C_FindObjectsFinal ([PKCS11-Base] 5.6)
 - p. C_GetAttributeValue ([PKCS11-Base] 5.7)
 6. Supports the following mechanisms:
 - a. None specified
 7. Supports Error Handling ([PKCS11-Base] 5.1) for any supported object, function or mechanism
 8. Optionally supports any clause within [PKCS11-Base] that is not listed above
 9. Optionally supports extensions outside the scope of this standard (e.g., vendor defined extensions, conformance clauses) that do not contradict any PKCS #11 requirements

3.4 Extended Consumer Clause

This profile builds on the PKCS#11 Baseline Consumer profile to add support for mechanism-based usage.

3.4.1 Implementation Conformance

An implementation is a conforming Extended Consumer if it meets the conditions as outlined in the following section.

3.4.2 Conformance of a PKCS #11 Extended Consumer

An implementation conforms to this specification as Extended Consumer if it meets the following conditions:

1. Supports the conditions required by the PKCS11 conformance clauses ([PKCS11-Base] Section 6 (PKCS#11 Implementation Conformance))
2. Supports the conditions required by the PKCS11 Baseline Consumer clauses section 3.2
3. Supports the following data types:
 - a. CK_MECHANISM_TYPE ([PKCS11-Base] 3.4)
 - b. CK_MECHANISM ([PKCS11-Base] 3.4)
4. Supports the following attributes:
 - a. None specified
5. Supports the following objects:

- a. None specified
- 6. Supports the following functions:
 - a. C_GetMechanismList ([PKCS11-Base] 5.5)
 - b. C_GetMechanismInfo ([PKCS11-Base] 5.5)
- 7. Supports the following mechanisms:
 - a. None specified
- 8. Supports Error Handling ([PKCS11-Base] 5.1) for any supported object, function or mechanism
- 9. Optionally supports any clause within [PKCS11-Base] that is not listed above
- 10. Optionally supports extensions outside the scope of this standard (e.g., vendor defined extensions, conformance clauses) that do not contradict any PKCS #11 requirements

3.5 Extended Provider Clause

This profile builds on the PKCS#11 Baseline Provider to add support for mechanism-based usage.

3.5.1 Implementation Conformance

An implementation is a conforming Extended Provider if it meets the conditions as outlined in the following section.

3.5.2 Conformance of a PKCS #11 Extended Provider

An implementation conforms to this specification as Extended Provider if it meets the following conditions:

1. Supports the conditions required by the PKCS #11 conformance clauses ([PKCS11-Base] Section 6 (PKCS#11 Implementation Conformance))
2. Supports the conditions required by the PKCS #11 Baseline Provider clauses section 3.3.
3. Supports the following data types:
 - a. CK_MECHANISM_TYPE ([PKCS11-Base] 3.4)
 - b. CK_MECHANISM ([PKCS11-Base] 3.4)
4. Supports the following attributes:
 - a. None specified
5. Supports the following objects:
 - a. CKO_PROFILE ([PKCS11-Base] 4.13) with value CKP_EXTENDED_PROVIDER
6. Supports the following functions:
 - a. C_GetMechanismList ([PKCS11-Base] 5.5)
 - b. C_GetMechanismInfo ([PKCS11-Base] 5.5)
 - c. C_Login ([PKCS11-Base] 5.6)
 - d. C_LoginUser ([PKCS11-Base] 5.6)
 - e. C_Logout ([PKCS11-Base] 5.6)
7. Supports the following mechanisms:
 - a. None specified
8. Supports Error Handling ([PKCS11-Base] 5.1) for any supported object, function or mechanism
9. Optionally supports any clause within [PKCS11-Base] that is not listed above
10. Optionally supports extensions outside the scope of this standard (e.g., vendor defined extensions, conformance clauses) that do not contradict any PKCS #11 requirements

3.6 Authentication Token Clause

This profile builds on the PKCS #11 Baseline Provider and/or Baseline Consumer profiles to provide for use in the context of an authentication token.

3.6.1 Implementation Conformance

An implementation is a conforming Authentication Token if it meets the conditions as outlined in the following section.

3.6.2 Conformance of an Authentication Token

An implementation conforms to this specification as an Authentication Token if it meets the following conditions:

1. If the implementation is a consumer then it SHALL support the conditions required by the PKCS #11 Baseline Consumer Clause (Section 3.2)
2. If the implementation is a provider then it SHALL support the conditions required by the PKCS #11 Baseline Provider Clause (Section 3.3)
3. Supports the following data types:
 - a. None specified
4. Supports the following attributes:
 - a. None specified
5. Supports the following objects:
 - a. CKO_PRIVATE_KEY ([PKCS11-Base] 4.9)
 - b. CKO_PUBLIC_KEY ([PKCS11-Base] 4.8)
 - c. CKO_PROFILE ([PKCS11-Base] 4.13) with value CKP_AUTHENTICATION_TOKEN
6. Supports the following functions:
 - a. C_Login ([PKCS11-Base] 5.6)
 - b. C_LoginUser ([PKCS11-Base] 5.6)
 - c. C_Logout ([PKCS11-Base] 5.6)
 - d. C_SignInit ([PKCS11-Base] 5.13)
 - e. C_Sign and/or C_SignUpdate and C_SignFinal ([PKCS11-Base] 5.13)
7. Supports the following mechanisms:
 - a. None specified
8. Optionally supports any clause within [PKCS11-Base] that is not listed above
9. Optionally supports extensions outside the scope of this standard (e.g., vendor defined extensions, conformance clauses) that do not contradict any PKCS #11 requirements.

3.7 Public Certificates Token Clause

This profile builds on the PKCS #11 Baseline Provider and/or Baseline Consumer profiles to provide for use in the context of a public certificates token.

3.7.1 Implementation Conformance

An implementation is a conforming Public Certificates Token if it meets the conditions as outlined in the following section.

3.7.2 Conformance of a Public Certificates Token

An implementation conforms to this specification as Public Certificates Token if it meets the following conditions:

1. If the implementation is a consumer then it SHALL support the conditions required by the PKCS #11 Baseline Consumer Clause (Section 3.2)

2. If the implementation is a provider then it SHALL support the conditions required by the PKCS #11 Baseline Provider Clause (Section 3.3)
3. Supports the following data types:
 - a. None specified
4. Supports the following attributes:
 - a. None specified
5. Supports the following objects:
 - a. CKO_CERTIFICATE ([PKCS11-Base] 4.6)
 - b. CKO_PROFILE ([PKCS11-Base] 4.13) with value CKP_PUBLIC_CERTIFICATES_TOKEN
6. Supports the following functions:
 - a. None specified
7. Supports the following mechanisms:
 - a. None specified
8. Supports the following object location requirements:
 - a. All certificates are publicly readable, able to be found on the token without a login having been performed
 - b. All certificates for which a matching private key also exists on the token must have a matching CKA_ID attribute for the certificate and private key
 - c. One or more of the following conditions must be met:
 - i. The matching private key for a certificate can be found via C_FindObjects using the matching CKA_ID value without a login having been performed;
 - ii. The matching public key for a certificate can be found via C_FindObjects using the matching CKA_ID value without a login having been performed.
9. Optionally supports any clause within [PKCS11-Base] that is not listed above
10. Optionally supports extensions outside the scope of this standard (e.g., vendor defined extensions, conformance clauses) that do not contradict any PKCS #11 requirements.

Appendix A. Acknowledgments

The following individuals have participated in the creation of this specification and are gratefully acknowledged:

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Appendix B. Revision History

Revision	Date	Editor	Changes Made
wd06	28-May-2019	Tony Cox	Final cleanup of front introductory texts and links prior to CSPRD
wd05	18-Apr-2019	Tim Hudson	Remove CKA_USER reference
wd04	16-Apr-2019	Tim Hudson	Update given function name changes in specification
wd03	24-Sep-2018	Tim Hudson	Update based on list comments
wd02	19-Sep-2018	Tim Hudson	Update based on list comments
wd01	05-Sep-2018	Tim Hudson	Initial Draft