



**Diplomatic Technology**  
U.S. DEPARTMENT *of* STATE

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# **PUBLIC KEY INFRASTRUCTURE X.509 DOS OPENNET CERTIFICATE POLICY**

FOR THE  
Diplomatic Technology Bureau

PREPARED FOR:  
Diplomatic Technology Bureau

PREPARED BY:  
PKI Program Team

VERSION 3.1

AUGUST 2026



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## PKI POLICY MANAGEMENT AUTHORITY APPROVAL

The PKI Policy Management Authority is responsible for the development, review, and acceptance of this Certificate Policy.

This Certificate Policy has been reviewed and is approved for use.

**Paul J Newton**  
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**DOCUMENT VERSION CONTROL**

| <b>Version</b> | <b>Date</b>   | <b>Author(s)</b>                | <b>Reason For Change</b>                                                                                                |
|----------------|---------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| 1.0            | December 2007 | C. R. Froehlich                 | Publication                                                                                                             |
| 1.1            | March 2008    | R. L. Doty &<br>C. R. Froehlich | Minor editing & FBCA cross mapping revisions                                                                            |
| 1.2            | April 2008    | C. R. Froehlich                 | FBCA cross mapping revisions                                                                                            |
| 1.3            | July 2008     | R. L. Doty                      |                                                                                                                         |
| 1.4            | February 2009 | C. R. Froehlich                 | Reflect those changes to the FBCA CP that affect the DOS CP                                                             |
| 1.4.1          | January 2011  | C. R. Froehlich                 | Reflect those changes to the FBCA CP that affect the DOS CP                                                             |
| 1.4.2          | May 2011      | C. R. Froehlich                 | Reflect those changes to the FBCA CP that affect the DOS CP                                                             |
| 1.4.3          | July 2011     | C. R. Froehlich                 | Termination of FADS, cross-certification with the FCPCA;<br>Reflect those changes to the FBCA CP that affect the DOS CP |
| 1.4.4-1.4.7    | August 2011   | C. R. Froehlich                 | Reflect those changes to the FBCA CP that affect the DOS CP                                                             |
| 1.4.8          | October 2011  | C. R. Froehlich                 | Reflect those changes to the FBCA CP that affect the DOS CP                                                             |
| 1.4.9          | December 2011 | C. R. Froehlich                 | Reflect those changes to the FBCA and FCPCA CPs that affect the DOS CP                                                  |
| 1.5            | December 2011 | R. L. Doty                      | Restructuring of appendices                                                                                             |
| 1.6            | February 2012 | C. R. Froehlich                 | Reflect those changes to the FBCA and FCPCA CPs that affect the DOS CP                                                  |
| 1.7            | March 2012    | C. R. Froehlich                 | Reflect those changes to the FBCA and FCPCA CPs that affect the DOS CP                                                  |

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| Version | Date           | Author(s)                     | Reason For Change                                                                                                                                                             |
|---------|----------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.7.1   | June 2012      | C. R. Froehlich & S.R. Turner | Technical edit with mapping                                                                                                                                                   |
| 1.7.2   | April 2013     | C. R. Froehlich               | Reflecting changes to the FBCA/FCPCA CPs affecting DOS CP and corrections identified in audit                                                                                 |
| 1.7.3   | December 2013  | C. R. Froehlich               | Reflecting change to FBCA/FCPCA CPs affecting DOS CP and corrections identified in audit                                                                                      |
| 1.7.4   | September 2016 | L. Shomo                      | Reflecting changes to FBCA/FCPCA CPs affecting DOS CP and corrections identified in audit                                                                                     |
| 1.7.5   | September 2017 | L. Shomo                      | Reflecting changes to FBCA/FCPCA CPs affecting DOS CP, addition of PIV CA2, and corrections identified in audit                                                               |
| 1.7.6   | May 2018       | L. Shomo & R. L. Doty         | Removal of references to Common Policies, clarification of Sections 5.8 and 6.3.2, and reflect changes to the FBCA CP that affect the DOS CP. Clean up document formatting.   |
| 1.7.7   | September 2018 | L. Shomo                      | Add DOS Wildcard Certificate policy, change PKI Sponsor security clearance requirements, clarification of PMA and PM Roles description, and reflect changes to the FBCA CP.   |
| 1.7.8   | March 2021     | L. Shomo                      | Reflect changes to the FBCA CP, address audit and annual review findings, revise process for updating the CP, update information including removing references to the PIV CA. |

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| 1.7.9   | July 2021      | L. Shomo  | Address FPKI annual review comments.                                                                                                                                                                                                                                                                                                          |
| 2.0     | May 2023       | L. Shomo  | Reflect update of the FBCA CP to Version 3 and 3.1, including incorporating key recovery policy and updates to audit and archive. Add an administrator authentication certificate policy and certificate suspension. Modify Group and Role certificate requirements. Address compliance audit and annual review findings. Update Appendices.  |
| 2.0.1   | August 2023    | L. Shomo  | Minor grammar, punctuation, spelling and format corrections.                                                                                                                                                                                                                                                                                  |
| 2.1     | September 2023 | L. Shomo  | Reflect update of the FBCA CP to Version 3.2 and address FPKI 2022 Annual Review mapping variance findings.                                                                                                                                                                                                                                   |
| 2.1.1   | November 2023  | L. Shomo  | Address two KRA control of KED Key and third-party key recovery in Section 5.2.2.                                                                                                                                                                                                                                                             |
| 2.2     | February 2024  | L. Shomo  | Reflect update of the FBCA CP to Version 3.3 including clarify the requirements around certificate modifications, define requirements for certificate restoration, align audit and archive terminology for certificate status changes. Add support for certificate renewal and establish requirements for the destruction of CA signing keys. |

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| 3.0     | April 2025  | L. Shomo  | Reflect updates in FBCA CP v3.4 through 3.6 plus Change Proposal 2025-03. Add administratorAuth, strongAuth, derived-flacAuth, and derived-flacAuth-Hardware DOS certificate policies. Phase-out DOS use of the High Assurance certificate policy. Modify role-based certificate requirements. Add representations and warranties for several PKI entities. Update or clarify requirements for Key Generation Ceremonies, CP and CPS updates, destruction of sensitive keys and cryptographic materials, and DOS certificate and CRL content. Restructure PKI management roles to reflect changed DOS organizational structure. |
| 3.1     | August 2026 | D. Phelan | Reflect changes from External audit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

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## 1. INTRODUCTION

The United States Department of State (DOS) has implemented a Public-Key Infrastructure (PKI) that provides a method for securing transmission of information across department information system assets, supporting the verification of an entity's identity for physical and logical access control, verifying the integrity of data, ensuring the confidentiality of data, and implementing legally binding digital signatures.

A PKI consists of products and services that provide and manage X.509 certificates for public key cryptography. Public key cryptography is an information technology security service that can provide identity authentication, data integrity verification, technical non-repudiation, confidentiality (i.e., privacy), and digital signatures for electronic transactions.

This DOS OPKI CP defines multiple certificate policies for use by the DOS OPKI Certification Authorities (CAs) to facilitate interoperability:

- Internally within the DOS,
- Between the DOS OPKI domain and the PKI domains cross-certified with the Federal Bridge Certification Authority (FBCA),
- Between the DOS OPKI domain and the Federal Common Policy Framework (FCPF) PKI domain, and
- Between the DOS OPKI domain and other Entity PKI domains.

The policies represent five different assurance levels (Rudimentary, Basic, Medium, Medium Hardware, and High) for public key certificates. The level of assurance refers to the strength of the binding between the public key and the entity whose subject name is cited in the certificate, the mechanisms used to control the use of the private key, and the security provided by the PKI itself.

All subordinate CA certificates contain a NIST-registered Certificate Policy Object Identifier (OID), which a Relying Party may use to decide whether a certificate is trusted for a particular purpose. The OID corresponds to a specific level of assurance and intended use established by this CP. Each end-entity or subordinate CA certificate issued by the DOS OPKI **shall** assert the appropriate certificate policy OIDs in the *certificatePolicies* extension field of the certificate.

Any use of or reference to this DOS OPKI CP outside the purview of the Department of State PKI Policy Management Authority (DOS PKI PMA) is completely at the using party's risk. An Entity outside the Department of State **must not** assert the DOS OPKI CP certificate policy OIDs in any certificates the Entity CA issues, except in the *policyMappings* extension of a cross-certificate establishing an equivalency between a certificate policy defined in the DOS CP for the DOS OPKI and a certificate policy defined in in that Entity CA's CP.

This DOS OPKI CP is consistent with the *Internet Engineering Task Force (IETF) Public Key Infrastructure X.509 (PKIX) RFC 3647, Certificate Policy and Certification Practices Framework*. Users **must** interpret the terms and provisions of this CP under, and be governed by,

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applicable Federal law. This policy is also in consonance with and augments the information system security requirements in Foreign Affairs Manual, Chapter 12 Section 600 (12 FAM 600).

The reliability of the public key cryptography portion of a security solution is a direct result of the secure and trustworthy operation of an established PKI, including equipment, facilities, personnel, and procedures. This DOS OPKI CP applies to certificates issued to person entities (PEs) including Federal employees, contractors, and other affiliated personnel for the purposes of authentication, digital signature, and confidentiality. This CP also applies to certificates issued to non-person entities (NPEs) including devices, systems, and applications for the purposes of authentication, and confidentiality. The Subscriber certificate policies require Federal employees, contractors, and other affiliated personnel to use Federal Information Processing Standards Publication (FIPS Pub) 140 validated cryptographic modules for cryptographic operations and the protection of trusted private keys. The Subscriber certificate policies for NPEs also require the use of FIPS Pub 140 validated cryptographic modules for cryptographic operations and the protection of trusted private keys.

In this Certificate Policy document the following terminology and conventions are used:

- The “DOS” acronym is used to refer to the Department of State as an entity.
- The term “DOS PKI” is used to refer to any or all PKIs operated by the DOS.
- The term “DOS OpenNet PKI” or its acronym “DOS OPKI” is used to refer to the specific PKI operated by the DOS to secure its DOS OpenNet Sensitive But Unclassified (SBU) environment, which is the specific DOS PKI addressed by this Certificate Policy.
- The term “Certificate Policy” or the acronym “CP” refers to a X.509 Certificate Policy document governing a PKI.
- The term “certificate policy” refers to one of the certificate policies defined in a CP for a specific use which has a unique Certificate Policy Object Identifier (OID) assigned to it and is registered in the NIST Computer Security Objects Register CSOR).
- The term “Certificate Management Authority”, or the acronym “CMA”, is a collective term used to refer to the personnel and systems responsible for managing a Certification Authority (CA), including the DOS PKI Operational Authority, the Certification Authority and its associated Card Management System(s), and Registration Authority.
- The term “Registration Authority” and its acronym “RA” is used to refer to an entity authorized by the certification authority to collect, verify, and submit information provided by potential Subscribers which is to be entered into public key certificates. It refers to hardware, software, and individuals that collectively perform this function. The term and its acronym may be used to refer to an individual performing this function or to the collective of all the individual entities performing the RA function for a PKI or a CA (determined by the context in which it is used).

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**UNCLASSIFIED****1.1 OVERVIEW****1.1.1 Certificate Policy**

The United States *Department of State OpenNet Public Key Infrastructure X.509 Certificate Policy* (DOS OPKI CP) is the policy under which a designated Department component establishes and operates a Root Certification Authority (Root CA) and its subordinate Certification Authorities. The CP defines policies that establish distinct assurance levels for certificates issued by the DOS OPKI CAs. Relying parties may base the reliance they choose to place on a given level of certificate assurance on the following:

- Amount and type of inherent risk of an activity,
- Consequence of failure, and
- Use of risk mitigation controls.

This document does not define certificate policy for CAs operated by external entities that communicate with the Department, and who issue their own certificates.

In addition, this document defines the creation and management of X.509, version 3, public key certificates for use in applications requiring trusted communication between networked computer-based systems. Such applications include but are not limited to the following examples: electronic mail; transmission of SBU<sup>1</sup> information; signature of electronic forms; signature of contracts; and authentication of infrastructure components such as web servers, firewalls, directories, and mobile code.

Specific subordinate CAs in the DOS OPKI also issue certificates for Personal Identity Verification (PIV) credentials issued to Department employees, contractors and other affiliated personnel, and derived-PIV credentials issued for use with mobile devices. These PIV-credential related activities are governed by the *X.509 Certificate Policy for the U.S. Federal PKI Common Policy Framework* (FCPF CP), not by this DOS OPKI CP.

Specific subordinate CAs in the DOS OPKI also issue certificates for DOS Facility Logical Access Cards (FLAC) credentials issued to Department employees, contractors and other affiliated personnel, and derived-FLAC credentials issued for use with mobile devices. These FLAC credential related activities are governed by this DOS OPKI CP and the *U.S. Department of State Bureau of Diplomatic Security DOS One Badge PIV Card Issuer (PCI) Operations Plan* (DS PCI OP).

The DOS OPKI does not issue PIV-I Cards.

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<sup>1</sup> The existence and use of the DOS OPKI does not authorize or support the transmission of classified information over unclassified networks. A separate PKI Infrastructure is established under CNSS Instruction No. 1300 for that purpose.

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**1.1.2 Relationship between the DOS OPKI CP and the DOS OPKI CPS**

The DOS OPKI CP states what assurance Subscribers and Relying Parties can place in a certificate issued by the DOS OPKI CAs. The DOS OPKI Certification Practices Statement (CPS) addresses how the DOS OPKI CAs establish that assurance. The DOS OPKI CAs are:

- Root CA:
  - Active Directory Root CA (AD Root CA),
- Subordinate CAs:
  - Active Directory High Assurance CA (AD HACA),
  - Personal Identity Verification CA2 (PIV CA2),
  - Personal Identity Verification CA3 (PIV CA3), and
  - Derived-PIV Credential CA (DPC CA).

For PIV and derived-PIV certificates, the FCPF CP states what assurance Subscribers and Relying Parties can place in those certificates, and the DOS OPKI CPS addresses how the PIV CA2, PIV CA3 and DPC CA establish that assurance.

**1.1.3 Relationship between the DOS OPKI CP, FBCA, CP, FCPF CP, and Other Entity CPs**

The Federal PKI Policy Authority (FPKIPA) maps certificate policies and their levels of assurance between the DOS OPKI CP and the *X.509 Certificate Policy for the Federal Bridge Certification Authority* (FBCA CP) and *X.509 Certificate Policy for the U.S. Federal PKI Common Policy Framework* (FCPF CP). The relationship between these CPs is asserted via the *policyMappings* extension in a cross-certificate issued by the Federal Common Policy Root CA (FCPCA) to the DOS OPKI AD Root CA citing the equivalent FCPF CP and FBCA CP certificate policy for each applicable DOS OPKI certificate policy.

The FPKIPA also maps levels of assurance between the FBCA CP and various other External Entity PKI's CPs to facilitate trust and interoperability among a community of cross-certified PKIs. The DOS PKI Policy Management Authority (DOS PKI PMA) will generally accept the assurance level mapping determinations of the FPKIPA.

In the same manner that the FPKIPA maps levels of assurance between the FBCA CP and the DOS PKI CP, the DOS PKI PMA maps levels of assurance between another Entity PKI's CP to those in the DOS PKI CP, in order to establish a trust and interoperability relationship. The DOS PKI PMA **makes** the final determination that an External Entity PKI's certificate policies offer appropriately equivalent levels of assurance to the certificate policies specified in the DOS PKI CP, based on the analysis and recommendations of the DOS PKI Operational Authority (DOS PKI OA). The DOS PKI OA **must** respond to such decisions by implementing trust of the External Entity PKI's certificates by:

- Issuing a cross-certificate from the DOS OPKI AD Root CA to the External Entity PKI CA that asserts the relationship between these CPs via the *policyMappings* extension,

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- Placing the External Entity PKI CA's certificate in a DOS trust list, or
- Placing the External Entity PKI CA's certificate in certificate trust stores.

The DOS PKI PMA **must** notify the FPKIPA of any cross-certificates it issues to external PKIs.

**1.1.4 Scope**

This CP applies to certificates issued to CAs, devices, applications, Federal employees, contractors, and other affiliated personnel. This CP also applies to certificates issued to groups of people and to roles.

Programs that carry out or support the mission of the Department of State require services such as authentication, confidentiality, data-integrity, technical non-repudiation, and logical access control. An array of network security components, such as workstations, guards, firewalls, routers, in-line network encryptors, and trusted database servers, satisfy these service requirements. The use of public key cryptography supports and complements the operation of these components. This CP addresses a level of assurance comparable to the FBCA High and FCPF CP High Assurance Policies, and all lower assurance levels. Services provided by the DOS OPKI include:

- Key generation, storage, and recovery,
- Certificate generation, renewal, re-key, key recovery, modification, revocation, and distribution,
- Certificate Revocation List (CRL) generation and distribution,
- Online certificate status services,
- Directory management of certificate related items,
- Certificate token initialization, programming, and management, and
- System management functions (e.g., security audit, configuration management, archive).

The CP also defines requirements to ensure the security of these services:

- Subscriber identification and authorization verification,
- Control of computer and cryptographic systems,
- Operation of computer and cryptographic systems,
- Usage of keys and public key certificates by Subscribers, and
- Rules defining limitations of liability and to provide a high degree of certainty.

**1.1.5 Interaction with PKIs External to the Federal Government**

The DOS PKI AD Root CA achieves interoperation with non-Federal CAs that issue under different policies by policy mapping and cross-certification through the FBCA, the FCPCA, or directly with the agency in question. The DOS PKI AD Root CA extends interoperability with non-Federal entities only when it is beneficial to the Federal Government and to the mission of

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the Department. The DOS PKI PMA **must notify** the FPKIPA of any cross-certificates it issues to external PKIs.

When the DOS PKI needs to directly establish interoperability with an External Entity PKI, the DOS PKI PMA **must** develop a Memorandum of Agreement (MOA) to be signed by the DOS Principal Deputy Chief Information Officer (PDCIO) and an authorized representative of the External Entity. The MOA **must** detail the agreement between the External Entity and the DOS PKI covering interoperability between the two entities which is enabled via cross-certification between them. Specifically, it sets forth the rights, responsibilities and reservations of both Parties governing the External Entity's interoperation with the DOS OPKI.

## **1.2 DOCUMENT NAME AND IDENTIFICATION**

The official title of this CP is the *U.S. Department of State OpenNet Public Key Infrastructure X.509 Certificate Policy*. There are eleven (11) certificate policies specified at five (5) levels of assurance in this Certificate Policy. Subsequent sections of this document define the levels of assurance asserted by this policy.

Each certificate policy has a certificate policy Security Object Identifier (OID) for the specific policy, that is asserted in the *certificatePolicies* extension in certificates issued by DOS CAs within the DOS OPKI.

The National Institute of Standards and Technology (NIST) assigned the following IETF notation arc for DOS CPs: 2.16.840.1.101.3.2.1.6.

International Organization for Standardization (ISO) notation represents this as:

state-policies OBJECT IDENTIFIER: = {joint-iso-ccitt (2) country (16) us (840)  
organization (1) gov (101) csor (3) pki (2) cert-policy (1) state-policies (6)}

The Department has registered the following certificate policies in the NIST Computer Security Objects Registry (CSOR) under this arc:

**Table 1-1 DOS OPKI Certificate Policy OIDs**

| <b>Certificate Policy</b>             | <b>Certificate Policy OID</b>   |
|---------------------------------------|---------------------------------|
| id-state-certpcy-rudimentaryAssurance | ::= {2.16.840.1.101.3.2.1.6.1}  |
| id-state-certpcy-basicAssurance       | ::= {2.16.840.1.101.3.2.1.6.2}  |
| id-state-certpcy-mediumAssurance      | ::= {2.16.840.1.101.3.2.1.6.3}  |
| id-state-certpcy-mediumHardware       | ::= {2.16.840.1.101.3.2.1.6.12} |
| id-state-certpcy-highAssurance        | ::= {2.16.840.1.101.3.2.1.6.4}  |
| id-state-certpcy-administratorAuth    | ::= {2.16.840.1.101.3.2.1.6.13} |

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**Table 1-1 DOS OPKI Certificate Policy OIDs**

| <b>Certificate Policy</b>                  | <b>Certificate Policy OID</b>   |
|--------------------------------------------|---------------------------------|
| id-state-certpcy-strongAuth                | ::= {2.16.840.1.101.3.2.1.6.14} |
| id-state-certpcy-mediumDevice              | ::= {2.16.840.1.101.3.2.1.6.37} |
| id-state-certpcy-mediumDeviceHardware      | ::= {2.16.840.1.101.3.2.1.6.38} |
| id-state-certpcy-derived-flacAuth          | ::= {2.16.840.1.101.3.2.1.6.20} |
| id-state-certpcy-derived-flacAuth-hardware | ::= {2.16.840.1.101.3.2.1.6.21} |

The levels of assurance of each of the certificate policies is shown in the following table.

**Table 1-2 Assurance Level of DOS OPKI Certificate Policies**

| <b>Certificate Policy</b>                  | <b>Assurance Level</b> |
|--------------------------------------------|------------------------|
| id-state-certpcy-rudimentaryAssurance      | Rudimentary            |
| id-state-certpcy-basicAssurance            | Basic                  |
| id-state-certpcy-mediumAssurance           | Medium                 |
| id-state-certpcy-mediumHardware            | Medium Hardware        |
| id-state-certpcy-highAssurance             | High                   |
| id-state-certpcy-administratorAuth         | Medium Hardware        |
| id-state-certpcy-strongAuth                | Medium Hardware        |
| id-state-certpcy-mediumDevice              | Medium                 |
| id-state-certpcy-mediumDeviceHardware      | Medium Hardware        |
| id-state-certpcy-derived-flacAuth          | Medium                 |
| id-state-certpcy-derived-flacAuth-hardware | Medium Hardware        |

Certificates valid for the following policies are issued to Human Subscribers:

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Table 1-3 DOS OPKI Human Subscriber Certificates

| Certificate Type                             | Certificate Policy                                                                                    |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Basic Assurance Authentication Certificate   | id-state-certpcy-basicAssurance                                                                       |
| FLAC Authentication Certificate              | id-state-certpcy-mediumHardware                                                                       |
| FLAC Digital Signature Certificate           | id-state-certpcy-mediumHardware                                                                       |
| FLAC Key Management Key Certificate          | id-state-certpcy-mediumAssurance<br>id-state-certpcy-mediumHardware                                   |
| Derived-FLAC Authentication Certificate      | id-state-certpcy-derived-flacAuth<br>id-state-certpcy-derived-flacAuth-hardware                       |
| Strong Authentication Certificate            | id-state-certpcy-strongAuth                                                                           |
| Administrator Authentication Certificate     | id-state-certpcy-administratorAuth                                                                    |
| SNAP Digital Signature Certificate           | id-state-certpcy-mediumHardware<br>id-state-certpcy-highAssurance                                     |
| SNAP Key Management Key Certificate          | id-state-certpcy-mediumAssurance<br>id-state-certpcy-mediumHardware<br>id-state-certpcy-highAssurance |
| Role Holder Digital Signature Certificate    | id-state-certpcy-mediumHardware<br>id-state-certpcy-highAssurance                                     |
| Role Delegated Digital Signature Certificate | id-state-certpcy-mediumHardware<br>id-state-certpcy-highAssurance                                     |
| Group Digital Signature Certificate          | id-state-certpcy-mediumAssurance<br>id-state-certpcy-mediumHardware                                   |
| Group Key Management Key Certificate         | id-state-certpcy-mediumAssurance<br>id-state-certpcy-mediumHardware                                   |

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| Certificate Type                      | Certificate Policy                                                                                           |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Code Signing Certificate              | id-state-certpcy-mediumHardware<br>id-state-certpcy-highAssurance                                            |
| All other hardware-based certificates | id-state-certpcy-mediumHardware<br>id-state-certpcy-highAssurance                                            |
| All software-based certificates       | id-state-certpcy-rudimentaryAssurance<br>id-state-certpcy-basicAssurance<br>id-state-certpcy-mediumAssurance |

The DOS OPKI AD Root CA is not subordinate to the FCPCA, but policies in the DOS OPKI CP have been cross-mapped at the Medium Assurance level and above to non-PIV-specific policies in the FCPF CP.

The CPS for the DOS OPKI AD Root CA and its subordinate CAs **must** specify which policy OIDs that each CA may assert.

The DOS OPKI CP *id-state-certpcy-rudimentaryAssurance*, *id-state-certpcy-basicAssurance*, *id-state-certpcy-strongAuth*, *id-state-certpcy-administratorAuth*, *id-state-certpcy-derived-flacAuth*, and *id-state-certpcy-derived-flacAuth-hardware* policies **are not** cross-certified to FBCA CP policies or to FCPF CP policies. Certificates asserting these policies **shall** only be locally trusted (OLT) within the DOS.

The DOS OPKI does not assert the Medium and Medium Hardware Commercial Best Practice (Medium-CBP and MediumHW-CBP) policies defined in the FBCA CP.

The DOS OPKI **shall** phase-out the use of the *id-state-certpcy-highAssurance* certificate policy and replace it with the *id-state-certpcy-mediumHardware* certificate policy no later than September 30, 2025. Existing certificates that currently assert the *id-state-certpcy-highAssurance* certificate policy will be allowed to expire. The new certificates will assert the *id-state-certpcy-mediumHardware* certificate policy instead.

Note: For key management certificates, asserting the *id-state-certpcy-mediumAssurance* certificate policy instead of asserting the *id-state-certpcy-mediumHardware* certificate policy should be considered as it provides implementation flexibility for specific use cases such as mobile devices and key recovery.

The DOS OPKI does not issue certificates for Personal Identity Verification Interoperable (PIV-I) cards as defined in the FBCA CP.

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For DOS Facility Logical Access Cards (FLAC) issued by the PIV CA2 and PIV CA3, the card authentication certificate asserts the *id-fpki-common-pivi-cardAuth* certificate policy defined by the FCPF CP.

Certificates valid for the following policies are issued to Device Subscribers:

**Table 1-4 DOS OPKI Device Subscriber Certificates**

| Certificate                                                             | Certificate Policy                           |
|-------------------------------------------------------------------------|----------------------------------------------|
| For devices that use a FIPS 140 Level 1 cryptographic module            | <i>id-state-certpcy-mediumDevice</i>         |
| For devices that use a FIPS 140 Level 2 or higher cryptographic modules | <i>id-state-certpcy-mediumDeviceHardware</i> |

In this document, the term “device” is defined as a non-person entity (NPE), e.g., a hardware device/system or software application.

Certificates issued to NPEs **must** assert either the *id-state-certpcy-mediumDevice* or the *id-state-certpcy-mediumDeviceHardware* certificate policy.

### 1.3 PKI PARTICIPANTS

The Under Secretary for Management has assigned responsibility for the Department of State PKIs to the Bureau of Diplomatic Technology (DT). DOS 1 FAM 275.1-2 outlines this responsibility. The following are roles relevant to the administration and operation of the DOS OPKI and its CAs.

#### 1.3.1 PKI Authorities

The Department of State Chief Information Officer (CIO) heads the DT Bureau and is responsible for funding PKI, management of the PKI investment, and via the DT Technology Review Board (DT-TRB) the validation of PKI hardware and software configurations.

The DOS Deputy Chief Information Officer has delegated the DOS PKI PMA role to the Chief of the Identity, Credential & Access Management Division (ES/IS/ICAM).

##### 1.3.1.1 PKI Policy Management Authority

The Chief of the Identity, Credential & Access Management Division (ES/IS/ICAM) is the DOS PKI Policy Management Authority (DOS PKI PMA).

The DOS PKI PMA has the following **responsibilities** regarding the DOS OPKI:

- Maintaining and approving the DOS OPKI CP,

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- May grant policy waivers in order to meet urgent, unforeseen operational requirements, providing the waivers do not contradict requirements from the FBCA or FCPF CPS,
- Approving the CPS for each DOS OPKI CA,
- Ensuring all DOS OPKI components are operated in compliance with an appropriate CPS and this CP,
- Requiring periodic and ad hoc audits of the compliance of CPSs with the governing CPs, and the compliance of DOS OPKI operations with the governing CPSs,
- Approving compliance audit reports for each CA and Registration Authority (RA) issuing certificates under this CP,
- Approving remedial actions to address audit findings, based on the recommendation of the DOS PKI Operational Authority,
- Submitting Annual Review packages to the FPKIPA,
- Ensuring representation of the DOS PKI Program and the DOS's interests in all internal and external matters and bodies relative to PKI technology,
- Identifying an individual to serve as the liaison to the FPKIPA,
- Interfacing with DOS management on PKI matters, and addressing issues such as policy, budgets, cross-certification and subordination, and continuity of operations and relocation during an emergency,
- Ensuring the conformity of the OpenNet PKI implementation and operation to DOS policies,
- Approving the issuance of certificates from the DOS OPKI AD Root CA to subordinate DOS OPKI CAs,
- Approving the issuance of cross-certificates from the DOS OPKI Root CA to external entity CAs,
- Approving DOS OPKI AD Root CA key generation, re-key and key destruction,
- Approving the generation and destruction of DOS OPKI CA signing keys,
- Approving the release the contents of the DOS OPKI archive,
- Determining the criteria for cross-certification with other PKI Entities
- Responding to applications received from External Entity PKIs seeking direct cross-certification and interoperability with the DOS OPKI,
- Making the final determination that an External Entity PKI's certificate policies offer appropriately equivalent levels of assurance to the certificate policies specified in the DOS OPKI CP to warrant the establishment of a trust relationship,
- Developing a Memorandum of Agreement (MOA) to be signed by the DOS Principal Deputy Chief Information Officer (PDCIO) and an authorized representative of the External Entity PKI that details the agreement between the External Entity PKI and the DOS OPKI covering interoperability between the two entities which is enabled via cross-

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certification between them. Specifically, it sets forth the rights, responsibilities and reservations of both Parties governing the External Entity's interoperation with the DOS OPKI,

- Ensuring the continued conformance of cross-certified External Entity PKIs with applicable requirements,
- Submitting the cross-certificate applications to the FPKIPA.
- Requesting modification of the current cross-certificate issued to the DOS OPKI AD Root CA by the FPKIPA,
- Notifying the FPKIPA of any cross-certificates the DOS OPKI AD Root CA issues to external PKIs,
- Notifying the FPKIPA of any change to the DOS OPKI infrastructure that has the potential to affect the FPKI operational environment at least two weeks prior to implementation,
- Notifying the FPKIPA and other entities cross-certified with the DOS OPKI AD Root CA, at least two weeks prior to the revocation of a DOS OPKI CA certificate,
- Notifying the FPKIPA if revocation of a DOS OPKI AD Root CA-issued certificate is due to a certificate or system compromise, or a cross-certified Entity CA violation of their Memorandum of Agreement with the DOS OPKI, and
- Notifying the FPKIPA and Relying Parties of policy waivers granted.

The DOS PKI PMA **must** be a Department of State direct-hire employee.

***1.3.1.2 PKI Operational Authority***

The DOS PKI OA is a management position in the Identity, Credential & Access Management Division (ES/IS/ICAM).

The DOS PKI OA has the following **responsibilities** regarding the DOS OPKI:

- Overseeing the implementation, operations, and maintenance of the DOS OPKI AD Root CA, all subordinate CAs, Certificate Status Servers (CSSs), Card Management Systems (CMSs), and Registration Authorities (RAs), excluding the CMS and RA for PIV CA2 and PIV CA3,
- Managing the issuance and lifecycle management of all certificates issued by DOS OPKI CAs,
- Ensuring that the performance of all aspects of CA services, operations, and infrastructure related to certificates issued under this policy are in accordance with the requirements, representations, and warranties of this policy,
- Conducting a review of this DOS OPKI CP at least once every year and identifying and recommending corrections, updates, or changes, as appropriate,

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- Reviewing changes to the CP proposed by DOS entities and rejecting or tentatively accepting and forwarding them to the DOS PKI PMA for approval,
- Creating and maintaining a CPS for each DOS OPKI CA,
- Submitting the new or updated CPS, and the results of an audit of its compliance with the DOS OPKI CP, and with the FCPF CP for PIV and derived PIV certificates, to the DOS PKI PMA for approval,
- Reviewing namespace control procedures to ensure that distinguished names are uniquely assigned for all certificates issued under this CP,
- Approving all wildcard certificate requests,
- Recommending implementation of new OPKI CAs and re-key of existing DOS OPKI CAs,
- Executing DOS PKI PMA instructions to issue or revoke certificates from the DOS OPKI AD Root CA,
- Designating a person or group of persons responsible for making required security checks before leaving a OPKI Strong Room unattended,
- Appointing and removing personnel from PKI Trusted Roles,
- Taking appropriate administrative and disciplinary actions against personnel who have performed actions involving the DOS OPKI CAs, RAs, Key Recovery Systems (KRS), CSSs, or repositories not authorized in this CP, the applicable CPS, or other approved documented procedures,
- Ensuring that archived data is transferred to new media periodically if the original media cannot retain the data for the required period,
- Approving KGC documents before they are executed,
- Approving the DOS OpenNet PKI Certificate & CRL Content Specifications document and updates thereto,
- Reporting audit findings and the proposed corrective actions,
- Ensuring that identified corrective actions for audit findings are implemented in a timely manner,
- Conducting privacy impact assessments of OPKI systems, and
- Promptly implementing the incident and compromise handling procedures specified in Section 5.7.1.

The DOS PKI OA reports to the DOS PKI PMA.

The DOS PKI OA **must** be a Department of State direct-hire employee.

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The DOS Deputy PKI Program Manager for Operations (DOS DPKI PM OPS) is a management position in the Identity, Credential & Access Management Division (ES/IS/ICAM).

The DOS DPKI PM OPS has the following **responsibilities** regarding the DOS OPKI:

- Managing the implementation, operations, and maintenance functions for the DOS OPKI infrastructure delegated to the position by the DOS PKI OA.

The DOS DPKI PM OPS **must** be a Department of State direct-hire employee.

***1.3.1.4 Deputy PKI Program Manager for Deployment***

The DOS Deputy PKI Program Manager for Deployment (DOS DPKI PM DEP) is a management position in the Identity, Credential & Access Management Division (ES/IS/ICAM).

The DOS DPKI PM DEP has the following **responsibilities** regarding the DOS OPKI:

- Managing the operational deployment and lifecycle management of certificates functions for the DOS OPKI delegated to the position by the DOS PKI OA.

The DOS DPKI PM DEP **must** be a Department of State direct-hire employee.

***1.3.1.5 PKI Program Office***

The DOS PKI Program Office (DOS PKIPO) comprises the Engineering, Operations, Policy and Audit staff, including both trusted (See Section 5.2.1) and non-trusted role positions. The DOS PKIPO has the following **responsibilities** regarding the DOS OPKI:

- The PKI Registration Center and Deployment staff administers the Department's PKI from an operational perspective, including:
  - Controlling the registration, identification and authentication, and certificate manufacturing processes with individual offices and posts, and the Diplomatic Security Bureau, to include support to the DOS PIV Card Program
  - Publishing of certificates in the appropriate directories
  - Coordinating and performing installation worldwide of card readers and middleware
  - Reviewing name space control procedures with the Distinguished Naming Authority to ensure that distinguished names are uniquely assigned for all certificates issued under the DOS OPKI CP
  - Ensuring that all aspects of CA services, operations and infrastructure related to certificates issued are performed in accordance with the requirements, representations, and warranties of the CP, the DOS Subordinate CA CPSs, and Department policy
  - Developing, coordinating, and presenting PKI Training for Systems Administrators, Local Registration Authorities, Special Agent Local Registration Authorities (SA-

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LRA), Information System Security Officers, and End Users; and preparing training and information materials for worldwide distribution including a security awareness and training package for PKI Sponsors on “User Rules of Behavior”

- The PKI Engineering staff manages technical operational issues, including:
  - Setting up, testing, and administering the DOS OPKI CAs
  - Implementing the PKI and all hardware/software components, including approved CRs
  - Issuing and revoking certificates to subordinate CAs, and to RA Subscribers from those CAs
  - Establishing a certificate repository and certificate and authority revocation lists
  - Providing repository/directory integration support to the Department’s networks
  - Administering the Department’s PKI from a key management perspective, including re-key of CA signing material
  - Providing application development and modification technical support to application owners to PKI-enable applications and web sites, and developing databases to support internal and external operations
  - Integrating smart card and biometric technologies in support of logical access control
- The PKI Policy and Audit Team has the following responsibilities regarding the DOS OPKI:
  - Creating and revising Certificate Policy and Certification Practices Statements, including evaluation of changes requested by Department of State bureaus, and recommending for approval/disapproval to the DOS PKI PMA, to maintain the level of assurance and operational practicality
  - Ensuring that the DOS OPKI CP and all CA CPSs continue general conformance to the FBCA/FCPF CPs and to Department of State 5 FAM and 12 FAM, respectively
  - Reviewing commercial CAs that offer services to the Department by analyzing CPS documents to ensure that the practices of CAs serving the Department comply with these Certificate Policies, and recommending acceptance/rejection to the DOS PKI PMA
  - Establishing and maintaining operational policy and practices for the DOS CAs and RAs
  - Performing Assessment and Authorization (A&A) activities, including preparation of system security plans, conducting annual system security self-assessment reviews, and preparing Plans of Action and Milestones
  - Performing Backup and Contingency planning, including developing policies and procedures for system backup, key recovery and key escrow, and disaster recovery and contingency planning to ensure continuity of operations
  - Participating in the Federal PKI Policy Authority and its working groups to ensure compliance to the Federal model

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- Conducting liaison with other government agencies concerning PKI matters
- Acting as a focal point for DOS OPKI working groups, as well as PIV working groups on PKI-related matters
- Reviewing all working group documentation prior to dissemination to the working group members and other involved parties
- Coordinating with the Department's Records Management Office to ensure compliance with Federal records management regulations, Freedom of Information and Privacy Act matters.

***1.3.1.6 The Diplomatic Security Service One Badge Program Management***

The Diplomatic Security Service/Office of Security Technology/Security Systems Integrity Division/Identity Management Program (DS/ST/SSI/IDM) is responsible for the implementation and maintenance of the DOS One Badge systems, and the Diplomatic Security Service/Domestic Operations/Office of Domestic Facilities Protection/ Security Support Division (DS/DO/DFP/SSD) administers the Department's One Badge Program (Personal Identity Verification (PIV) Cards, Facility Logical Access Cards (FLAC),) from an operational perspective for new and existing employee issuances, renewals, identity and/or clearance modifications, and replacement of lost, stolen, compromised or damaged cards, in accordance with *U.S. Department of State Bureau of Diplomatic Security DOS One Badge PIV Card Issuer (PCI) Operations Plan* (DS PCI OP) including:

- Validation/revalidation of identity and security clearance status of DOS government and contractor employees, and vendors
- Validation/revalidation of physical access requirements
- Confirms the conduct of requisite security briefings for cleared employees by Diplomatic Security Service/Security Infrastructure/Information Security/Program Applications Division (DS/SI/IS/PAD)
- Preparation of the PIV and FLAC cards, including taking of digital photographs and fingerprints
- Submission, as the PIV RA, for installation of the mandatory PIV Authentication certificate on PIV cards, and installation of the FLAC Authentication certificate on FLAC cards
- Issuance of completed PIV and FLAC cards to the appropriate individuals following re-confirmation of identity
- Maintaining PIV and FLAC card registration records and documentation, including those off-line records relative to PKI
- Inventory, control and security of blank PIV and FLAC card stock issued by the DS/DO/DFP staff; the PIV Card Custodian has total control of blank card stock in accordance with the Standing Operating Procedures for Accountability and Control of Blank 64K DOS Personal ID Cards (HSPD-12 PIV and FLAC Cards).

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- Receipt, security, initial revocation processing of physical access codes and PIV Authentication certificates, and destruction of surrendered, invalidated, damaged, compromised, and/or recovered PIV and FLAC cards.

**1.3.2 Certification Authorities**

The CA is the collection of hardware, software and operating personnel that create, sign, and issue public key certificates to Subscribers. The CA is **responsible** for issuing and managing certificates including:

- The certificate manufacturing process
- Publication of certificates
- Revocation of certificates
- Generation and destruction of CA signing keys
- Ensuring that all aspects of the CA services, operations, and infrastructure related to certificates issued under this CP are performed in accordance with the requirements, representations, and warranties of this CP.

**1.3.2.1 Root Certification Authority**

The AD Root CA (the collection of hardware, software, and operating personnel) is the entity established by the DOS PKI PMA to certify subordinate CAs that, in turn, create, sign, and issue public key certificates to subscribers within DOS and other related PKI communities. The Department's PKI operates in a hierarchical fashion, utilizing a Root CA and subordinate CAs. The AD Root CA serves as the trust anchor for all certificates issued under this policy. The AD Root CA also acts as the Principal CA (PCA) for DOS to receive a cross-certificate from the FCPCA.

The PCA issues either end entity certificates, or CA certificates to other Entity or external party CAs, or both. The PCA **shall** cross-certify with the FCPCA, and other root level CAs from other trust domains, as appropriate. The PCA **must** also certify CAs within DOS that are part of the subordination hierarchy (as opposed to cross-certification).

The DOS **must** ensure that no CA under the DOS OPKI **shall** have more than one trust path to the FCPCA.

This policy permits both off-line and online Root CA operation. The AD Root CA **must** be logically and/or physically isolated from the DOS network. The DOS PKI OA is **responsible** for the DOS AD Root CA issuing and managing certificates; and ensuring that the performance of all aspects of CA services, operations, and infrastructure related to certificates issued under this policy are in accordance with the requirements, representations, and warranties of this policy. This includes the following:

- The AD Root CA certifies subordinate CAs, which **will assert** one or more assurance levels defined in this CP, and outlined in the appropriate CPS

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- The PCA **must** also comply with the requirements set forth in applicable MOA, Memorandum of Understanding (MOU), and contractual agreements with cross-certified CAs and/or other entities

**1.3.2.2 Subordinate Certification Authorities**

Subordinate CAs are **responsible** for all aspects of the issuance and management of a certificate to person entity subscribers and non-person entity subscribers (devices/systems/applications), including control over the enrollment process, the identification and authentication process, the certificate manufacturing process, publication of certificates, revocation of certificates, and re-key.

A CA which issues certificates that assert policies defined in this document **must** conform to the stipulations of this document, including the following:

- Providing to the appropriate authorities a CPS, as well as any subsequent changes, for conformance assessment
- Maintaining its operations in conformance to the stipulations of the approved CPS
- Ensuring that registration information is accepted only from RAs/LRAs who understand and are obligated to comply with this policy, and operating under an approved CPS
- Including only valid and appropriate information in the certificate, and to maintaining evidence that due diligence was exercised in validating the information contained in the certificate
- Ensuring that all Subscribers (government and non-government) are informed of their obligations under Sections 1.4 and 9.6.3, including the consequences of not complying with those obligations, and revoking the certificates of Subscribers found to have acted in a manner counter to those obligations
- Operating or obtaining the services of an online repository that satisfies the obligations under Sections 1, 9.6.1, and 9.6.5, and informing the repository service provider of those obligations if applicable

**1.3.3 Card Management System**

The CMS is **responsible** for managing the lifecycle of the cryptographic tokens containing subscriber private keys and certificates, such as smart cards or YubiKey tokens. RAs have a responsibility to ensure that CMSs that manage the token on which their certificates reside provide a level of security commensurate with the assurance level of the certificates.

**1.3.4 Registration Authority and Local Registration Authority**

A Registration Authority (RA) is an entity authorized by the CA to collect, verify, and submit information provided by potential Subscribers for the purpose of issuing public key certificates. The term RA refers to hardware, software, and individuals that may collectively perform this function.

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Individuals performing RA functions are acting in a Trusted Role as defined in Section 5.2.1 of this CP and are considered Officers as defined in Section 5.2.1.1.2 of this CP.

Trusted Roles, described in Section 5.2.1 perform functions that involve the handling of sensitive cryptographic material and can thus introduce security problems to the CA if not carried out properly.

The RA is **responsible** for:

- Control over the registration process, and
- The identification and authentication process.

A Local Registration Authority (LRA) may act on behalf of an RA and record information from and verify biometrics (e.g., photographs) on presented credentials for Applicants who cannot appear before the RA. The circumstances under which a LRA may perform this function are delineated in this CP and in the DOS OPKI CPS(s) for the CAs operating under the DOS OPKI, both of which are approved by the DOS PKI PMA.

An LRA is not a Trusted Role; however, the PKI **must** document any LRA authorization requirements to include:

- Trustworthiness vetting, and
- Training or government appointment (e.g., notary public).

All identity proofing audit artifacts produced by an LRA **must** be traceable to an individual.

DOS OPKI RAs and LRAs perform their functions in accordance with the DOS OPKI CPS(s) approved by the DOS PKI PMA for the CAs operating under the DOS OPKI.

All CAs, RAs, and LRAs **must** protect Subscriber personal information from unauthorized disclosure as mandated by the Privacy Act of 1974, as amended.

The responsibility for managing and performing RA and LRA functions for the DOS OPKI is divided between two DOS Bureaus. The Bureau of Diplomatic Security is **responsible** for managing and performing the RA and LRA functions for subscriber certificates issued from the PIV CA2 and PIV CA3 for PIV and FLAC cards. The Bureau of Diplomatic Technology (DT) is **responsible** for managing and performing RA and LRA functions for all other certificates issued by the DOS OPKI, including derived-PIV and derived FLAC certificates.

### **1.3.5 Certificate Status Servers**

The DOS OPKI includes an authority that provides status information about certificates on behalf of the DOS OPKI CAs through online transactions via CSSs. An example of a CSS is Online Certificate Status Protocol (OCSP) responders identified in the AIA extension. Where certificates identify the CSS as an authoritative source for revocation information, the operations of that authority are within the scope of this CP. A CSS **must** assert all policy OIDs for which it is authoritative. This policy does not cover OCSP servers that are locally trusted, as described in RFC 2560.

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The applicable requirements for physical, personnel, and procedural security controls, technical security controls, and Compliance Audit apply as follows:

- CA requirements apply to the Key Escrow Database (KED) and to the Data Decryption Server (DDS)
- RA requirements apply to Key Recovery Agent (KRA) personnel and KRA automated systems

**1.3.6.1 Key Escrow Database (KED)**

The KED is defined as the function, system, or subsystem that maintains the key escrow repository and responds to key registration requests. The KED also responds to key recovery requests from two or more KRAs or self-recovery by a current subscriber. Key escrow of Subscriber private decryption keys are **authorized** as described in the applicable CPS. Key escrow of Subscriber authentication and signature keys is **prohibited**.

Section 5.2.1.3 contains the description of Trusted Roles **required** to operate the KED.

**1.3.6.2 Data Decryption Server (DDS)**

The DOS OPKI has not implemented a Data Decryption Server.

**1.3.6.3 Key Recovery Agent (KRA)**

A KRA is an individual who is authorized, as specified in the applicable Certificate Practice Statement), to recover an escrowed key. The KRAs have high level, sensitive access to the KED and are considered Trusted Roles (see Section 5.2.1). KRAs can recover large numbers of keys, the number and location of KRAs should be closely controlled.

A KRA performs the following functions:

- Confirm validity and completeness of requests,
- Recover copies of escrowed keys; and
- Distribute copies of recovered keys to the Requestor, with protection as described in Section 4.12.1.2.1.

KRAs may conduct requestor identity verification and authorization validation when KROs are not used.

**1.3.6.4 Key Recovery Official (KRO)**

Organizations may opt to appoint a Key Recovery Official (KRO) to support key recovery requestor identity verification and authorization validation tasks; however, a KRO is not a Trusted Role.

A KRO's responsibilities are to perform the following functions:

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- Verify a Requestor's identity and authorization as stated by this policy,
- Assist authorized requestors in building key recovery requests,
- Utilize secure communication for key recovery requests to and responses from the KRA, and
- Participate in the distribution of escrowed keys to the Requestor, ensuring that it occurs as described by the associated practice statement (CPS or KRPS).

Note: The responsibilities of the Key Recovery Official do not require access to the KED and as a result the KRO is not considered a Trusted Role. However, organizations may assign multiple responsibilities to one person due to resource constraints. In scenarios where Trusted Roles may also be assigned to complete the duties of the KRO, the requirements for Separation of Duties per Section 5.2.4 **must** be enforced.

**1.3.7 Key Recovery Requestors**

A Requestor is the person that requests the recovery of a decryption private key. A Requestor may be the Subscriber or a third-party (e.g., supervisor, corporate officer, or law enforcement officer) authorized to request recovery of a Subscriber's escrowed key on behalf of the Subscriber or on behalf of the organization. Any individual who can demonstrate a verifiable authority and a need to obtain a recovered key may be considered a Requestor.

***1.3.7.1 Internal Third-Party Requestor***

An Internal Third-Party Requestor is any Requestor who is in the Subscriber's supervisory chain or otherwise authorized to obtain the Subscriber's key for the Issuing Organization (i.e., the organization on behalf of which the CA issues certificates to subscribers).

***1.3.7.2 External Third-Party Requestor***

An External Third-Party Requestor is someone (e.g., investigator) outside the Issuing Organization with a court order or other legal instrument to obtain the decryption private key of the Subscriber.

**1.3.8 Subscribers**

A Subscriber is a person entity or a non-person entity (device/system/application) to whom a certificate is issued. This entity's Distinguished Name (DN) appears as the subject in the certificate, and the entity asserts that it will use the key and certificate in accordance with this policy.

Sometimes, a PKI technically considers CAs as "Subscribers." However, the term "Subscriber" as used in this document refers only to those who request certificates for uses other than signing and issuing certificates or certificate status information.

Department of State PKI Subscribers and PKI Sponsors include but are not limited to the following categories of entities that may wish to conduct official Department business:

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- Department of State personnel: Direct Hire, Locally Engaged Staff (LES), Third Country Nationals (TCNs), Part-time/Intermittent/Temporary (PIT) employees, Personal Services Contractor (PSC) employees, Direct Hire Americans overseas, contractors, commercial vendors, and agents
- Department of State workstations, guards and firewalls, routers, in-line network encryptors, trusted servers (e.g., database, domain controller, FTP, and WWW), and other infrastructure components. These components **must** be under the cognizance of humans, who accept the certificate and are **responsible** for the protection and use of the associated private key
- Federal Government departments and agency personnel, and their contractors and agents
- State government personnel and official representatives of Non-Governmental Organizations (NGO)

AD Root CA Subscribers include only DOS PKIPO personnel and, when determined by the DOS PKI PMA, PKI network or hardware devices.

The Department of State may issue certificates to Subscribers other than employees of the U.S. Government, such as commercial vendors and agents, at the convenience of the Government and without fee, when those Subscribers have a bona fide need to possess a certificate issued by a Department of State CA. The Department of State CA **must** inform such Subscribers of the stipulations of this policy by including the provisions of Section 9.6.3 in the Subscriber agreements. These Subscribers are under the same policy obligations as those specified for a DOS direct hire.

Basic Assurance Authentication Certificates **must** assert the *id-state-certpcy-basicAssurance* certificate policy in the *certificatePolicies* extension field of the certificate and **must only** be issued to individuals who are unable to appear before an RA/LRA for identity proofing due to the remote location of their temporary duty assignment.

Administrator Authentication Certificates **must** assert the *id-state-certpcy-administratorAuth* certificate policy in the *certificatePolicies* extension field of the certificate and **must only** be issued to individuals that have been designated to perform system administrator duties within their organization.

There is a subset of Human Subscribers who will be issued role-based certificates. These certificates identify a specific role on behalf of which the Subscriber is authorized to act rather than the Subscriber's name. These certificates are issued in the interest of supporting accepted business practices. The role-based certificate can be used in situations where non-repudiation is desired. Normally, it will be issued in addition to an individual Subscriber certificate.

The DOS issues two types of role-based certificates:

- Role Holder Digital Signature certificates, and
- Role Delegated Digital Signature certificates.

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These role-based certificates are issued in addition to the person's individual Subscriber certificates. Both can be used in situations where non-repudiation is desired.

The Role Holder Digital Signature certificate is issued to the single individual assigned or appointed to a role that has unique authorization, e.g., "Secretary of State". The DOS OPKI does not issue Role Holder Digital Signature certificates in cases where multiple individuals are assigned or appointed to a single role.

Role Delegated Digital Signature certificates are issued to individuals other than the Role Holder who have been delegated the authority to sign documents on behalf of the Role Holder. Each of the Role Delegated Digital Signature certificates **must** have unique keys and certificate serial numbers. Delegated digital signature certificates are the only instance where an authorized private key holder is a different individual than the role holder named in the subject DN. In these instances, private key holder traceability is maintained via unique identifiers asserted in the Subject Alternative Name extension.

There is another subset of Human Subscribers who will be issued group certificates. The DOS issues two types of group certificates:

- Group Key Management Key certificates, and
- Group Digital Signature certificates.

Group Key Management Key certificates, also known as group encryption certificates, are used to facilitate scenarios where multiple individuals, using a shared private key, have the ability to decrypt information that was encrypted using one public key and sent to a shared location (e.g., a group email address).

Group Digital Signature certificates are used where multiple individuals who are members of a group have the ability to sign emails from the group email address, using a shared private key. Group Digital Signature certificates **must not** assert non-repudiation since the specific individual signing the email cannot be determined from the certificate.

### **1.3.9 PKI Sponsors**

A PKI Sponsor fills the role of a Subscriber for groups, disabled personnel, and NPEs named as public key certificate subjects. PKI Sponsors **must** be DOS Direct Hires. Where certificates are issued to one of these end entities, the end entity **must** have a human sponsor who is **responsible** for carrying out Subscriber duties.

For NPE certificates, the PKI Sponsor is **responsible** for obtaining the NPE certificate and ensuring that the private key and certificate are used in accordance with this policy. For role-based certificates the Role Holder is the PKI Sponsor, **responsible** for obtaining a Role Holder Digital Signature certificate and for identifying the human Subscriber(s) authorized to receive Role Delegated Digital Signature certificates for the role. For group certificates, the PKI Sponsor is **responsible** for obtaining the Group Key Management Key and Group Digital Signature certificates and for ensuring that only authorized individuals have access to the certificates and corresponding private key(s).

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The PKI Sponsors work with the RAs to register the above entities in accordance with Section 3.2.2 and 3.2.3, and are **responsible** for meeting the obligations of Subscribers as defined throughout this document.

**1.3.10 Affiliated Organizations**

Subscriber certificates may be issued on behalf of an organization, other than the organization operating the Entity PKI, that has a relationship with the subscriber; this is termed affiliation. The organizational affiliation will be indicated in the certificate. Affiliated Organizations are **responsible** for verifying the affiliation at the time of certificate application and requesting revocation of the certificate if the affiliation is no longer valid.

**1.3.11 Relying Parties**

A Relying Party uses a Subscriber's certificate to verify or establish:

- The identity and status of an individual
- The integrity of a digitally signed message
- The identity of the creator of a message
- Confidential communications with the Subscriber

The Relying Party relies on the validity of the binding between the Subscriber's name and public key. A Relying Party may use information in the certificate (such as Certificate Policy Identifiers) to determine the suitability of the certificate for a particular use. The Relying Party is **responsible** for deciding whether or how to check the validity of the certificate by checking the appropriate certificate status information. For this Certificate Policy, the relying party may be any Entity that wishes to validate the binding of a public key to the name of a federal employee, contractor, or other affiliated personnel.

This CP makes no assumptions or limitations regarding the identity of Relying Parties. While Relying Parties may be Subscribers, Relying Parties are not required to have an established relationship with the DOS OPKI CA, FBICA, FCPCA, or another Entity CA.

**1.3.12 Other Participants**

All CAs and RAs operating under this policy may require the services of other security and application authorities, such as external independent compliance auditors and attribute authorities. Each CA **must** identify, in its CPS, the parties **responsible** for providing such services and the mechanisms used to support these services. Section 5.2 provides more detail on these authorities, services, and mechanisms.

Additional organizations that have a role in PKI operation are:

- The Anti-Virus team (DT/ES/MCS/Enterprise Systems Security (ES<sup>2</sup>), also supports management and operation of the PKI. They provide anti-virus support in the form of up-to-date anti-viral software to all DOS OPKI CA servers and RA/LRA workstations.
- Bureau of Diplomatic Security (DS):

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- Establishes and promulgates physical security policies as appropriate to PKI
- Provides Intrusion Detection System (IDS) monitoring for PKI
- Takes appropriate investigative, administrative, and disciplinary action when a security violation or compromise is suspected
- Office of Information Assurance (DT/Cyber Operations (CO):
  - Validates that the PKI meets the security requirements as defined in 12 FAM
  - Conducts Assessment and Authorization (A&A) activities for the Designated Approving Authority as outlined in Federal Public Key Infrastructure Policy Authority (FPKIPA) Security Control Overlay of NIST Special Publication 800-53 Revision 5 Security Controls for Federal PKI Systems (FPKIPA 800-53 Overlay)
- Information Technology Review Board (TRB):
  - Approves specification change procedures
  - Defines technical specifications to be implemented by the DOS PKIPO
  - Defines the standard operating procedures for IT changes
- Third Party Compliance Auditors
  - Audit compliance of CPS with governing Certificate Policies
  - Audit compliance of PKI operations with the CPS
- Bureau of Diplomatic Technology (DT)
  - Provides networking including basic network security functions such as firewalls
  - Provides general IT/communications support
- Application Owners
  - Provide all necessary information and assistance to support PKI-enabling of their specific application

**1.4 CERTIFICATE USAGE****1.4.1 Appropriate Certificate Uses**

The sensitivity of the information processed or protected using certificates issued by a DOS OPKI CA may vary significantly. Relying Parties should evaluate the environment and the associated threats and vulnerabilities and determine the level of risk they are willing to accept based on the sensitivity or significance of the information. Each Relying Party makes this evaluation for its application outside the control of this DOS OPKI CP. To provide sufficient granularity, this CP specifies security requirements at five increasing, qualitative levels of assurance: Rudimentary, Basic, Medium, Medium Hardware, and High. The DOS AD Root CA issues at least one High assurance certificate, so the DOS AD Root CA will operate at that level.

All Department of State bureaus that use PKI technology to secure data are subject to the requirements of this policy. DOS requires other agencies that exchange information

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electronically with Department assets, including those requiring the security of Public Key technology, are subject to the Department's requirements as specified in 12 FAM 600. Each CA asserting this policy **must** state this requirement in the CPS and inform Subscribers of the limitation.

The level of assurance associated with a public key certificate describes the procedures and controls involved in validating a Subscriber's identity and binding that identity to a public key. It is the responsibility of the Relying Party to assess that level of assurance and determine if it meets their security requirements for some particular use. The level of assurance depends on the proper generation and management of the certificate and associated private keys, in accordance with the stipulations of this policy. Personnel, physical, procedural, and technical security controls contribute to the assurance level of the certificates issued by a certificate management authority or system.

The following table provides a brief description of the appropriate uses for certificates at each level of assurance defined in this CP. These descriptions are guidance and are not binding.

**Table 1-5 Certificate Uses**

| <b>Assurance Level</b> | <b>Appropriate Certificate Uses</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rudimentary            | This level provides the lowest degree of assurance concerning identity of the individual. One of the primary functions of this level is to provide data integrity to the digitally signed information. This level is relevant to environments in which the risk of malicious activity is considered low. It is not suitable for transactions requiring authentication, and is generally insufficient for transactions requiring confidentiality, but may be used for the latter where certificates having higher levels of assurance are unavailable. |
| Basic                  | This level provides a basic level of assurance relevant to environments where there are risks and consequences of data compromise, but which are not considered to be of major significance. This may include access to private information where the likelihood of malicious access is not high. This security level assumes that subscribers are not likely to be malicious.                                                                                                                                                                        |
| Medium                 | This level is relevant to environments where risks and consequences of data compromise are moderate. This may include transactions having substantial monetary value or risk of fraud, or involving access to private information where the likelihood of malicious access is substantial. This level of assurance includes the following certificate policies: Medium and Medium Device.                                                                                                                                                             |
| Medium Hardware        | This level is relevant to environments where threats to data are high or the consequences of the failure of security services are high. This may include very high value transactions or high levels of fraud risk. This level of assurance includes the following certificate policies: Medium Hardware and Medium Device Hardware.                                                                                                                                                                                                                  |

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Table 1-5 Certificate Uses

| Assurance Level | Appropriate Certificate Uses                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High            | This level is reserved for cross-certification with government entities and is appropriate for those environments where the threats to data are high, or the consequences of the failure of security services are high. This may include very high value transactions or high levels of fraud risk. This level of assurance includes the following certificate policies: High Assurance and Administrator Authentication. |

General usage for certificates covered by this policy includes:

- Digital signature services (authentication and data integrity)
- Protection (confidentiality)
- Technical non-repudiation
- Authentication of identity and status with the Department for access control to information systems across the Federal Government

Unless otherwise noted, signatures applied by Subscribers/PKI Sponsors to documentation and communications related to the issuance and lifecycle management of certificates should be digital signatures whenever possible. All signatures applied to documentation and communications related to the issuance and lifecycle management of certificates by RAs and/or other persons in trusted roles **must** be digital signatures using certificates issued by the appropriate CA at an equivalent or higher assurance level than the transaction signed whenever feasible. All signatures applied by the CA, CSS/OCSP if any, or any other device that is part of the DOS OPKI CA infrastructure **must** use digital signature certificates issued by that CA at the operating assurance level of the CA.

The DOS PKIPO **must** manage the resulting digitally signed records in accordance with this CP (See Section 5.5) and National Archives and Records Administration (NARA) established records management standards and guidelines applicable to PKI records. For records not directly associated with PKI transactions (e.g., certificate issuance is a PKI transaction), it is the responsibility of the implementer to ensure that the digital signatures can be validated for the full records retention period of the signed statements beyond the retention requirements identified in Table 5-5.

#### 1.4.2 Prohibited Certificate Uses

Subscribers **must not** use DOS OPKI certificates to conceal an unauthorized act as specified in Federal law or Department of State regulation (see 12 FAM 590). Examples of such actions include, but are not limited to, the following:

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- Use of PKI certificates, especially in conjunction with a DOS-issued PIV card, to gain unauthorized access to a federal facility, information system, or electronic data (e.g., Privacy information), or to enable others to gain such access
- Use of PKI certificates to facilitate and/or hide an unauthorized action, such as:
  - Transfer information to an unauthorized individual
  - Generate income for oneself or for an organization
  - View sexually explicit material, gamble, or for the purposes of conducting unlawful or malicious activities
  - Negatively affect the integrity, accessibility, and/or confidentiality of the Department's cyber infrastructure

The Department specifically prohibits such uses of PKI regardless of whether the use is during or outside normal work hours, whether use occurs on or off U.S. Government premises, or whether the use occurs within or outside the United States.

Each CA asserting this policy **must** state this requirement in the CPS and inform Subscribers of these usage limitations. All Department of State bureaus, offices, and posts that use PKI technology are subject to the requirements of this policy. Other agencies that exchange information electronically with Department assets using Public Key technology are subject to the Department's requirements.

FLAC Card Authentication certificates, (i.e., those that assert id-fpki-common-cardAuth or id-fpki-common-pivi-cardAuth) **must only** be used to authenticate the hardware token containing the associated private key and must not be interpreted as authenticating the presenter or holder of the token.

Certificates intended for code signing are **not permitted** under COMMON policy.

Role Delegated Digital Signature certificates **must not** assert authentication OIDs in the certificate Extended Key Usage (EKU).

Group Digital Signature certificates **must not** assert the non-repudiation bit in the Key Usage field.

## **1.5 POLICY ADMINISTRATION**

### **1.5.1 Organization Administering the Document**

The DOS PKI PMA is **responsible** for all aspects of this DOS OPKI CP.

### **1.5.2 Contact Person**

Direct questions regarding this CP to Director, Identity, Credential and Access Management Division, as the DOS PKI PMA, at the following address:

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U.S. Department of State Annex SA-7B  
Attn: DT/ES/IS/ICAM  
7958 Angus Court  
Springfield Virginia, 22153  
(202) 571-8607

The DOS PKI OA **must** maintain a list of the names of the individuals currently holding the following PKI positions and their contact information, and post it online on the DOS OpenNet in a location available to DOS OPKI Subscribers:

- DOS PKI Policy Management Authority
- DOS PKI Operational Authority
- DOS PKI Deputy Program Manager - Operations
- DOS PKI Deputy Program Manager - Deployment

**1.5.3 Person Determining Certification Practices Statement Suitability for the Policy**

Certification Practices Statements for each DOS OPKI CA **must** conform to the DOS PKI Certificate Policy. The Director, Identity, Credential and Access Management Division, as the DOS PKI PMA, **must** determine the suitability of any CPS to this policy. In each case, the DOS PKI PMA **must** base the determination of suitability on an external independent auditor's results and recommendations. See Section 8 for further details.

**1.5.4 CPS Approval Procedures**

The DOS PKI OA **must** create and maintain a CPS for each DOS OPKI CA. A single CPS may be written to cover multiple DOS OPKI CAs. Each CPS must be updated at least annually, or more frequently as required to:

- Ensure operational compliance with new or changed requirements in the latest approved DOS OPKI CP and FCPF CP,
- Reflect the execution of Plans of Action and Milestones (POA&M) responding to PKI Compliance Audit Findings and FPKIPA Annual Review Findings, and Reflect changes made to the DOS OPKI infrastructure and operating procedures, and
- Reflect changes made to the infrastructure, new capabilities implemented and changes in operating procedures.

The DOS PKI OA **must** submit the new or updated CPS, and the results of an audit of its compliance with the DOS OPKI CP, and with the FCPF CP for PIV and derived PIV certificates, to the DOS PKI PMA for approval. The DOS PKI PMA **must** make the final determination if the CPS complies with the DOS OPKI CP and FCPF CP. The DOS PKI PMA **must** accept or reject the CPS. If rejected, the DOS PKI OA **must** resolve the identified issues and resubmit the revised CPS to the DOS PKI PMA for approval.

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While waivers are discouraged, the DOS PKI PMA may grant policy waivers in order to meet urgent, unforeseen operational requirements. When the DOS PKI PMA grants such a waiver, the DOS PKI PMA **must** notify Relying Parties of said waiver, and:

- Implement a permanent change to the DOS OPKI CP to address the requirement, or
- Place a specific time limit, not to exceed one year, on the waiver.

The DOS PKI PMA **must** notify the FPKIPA of the waiver, and provide information regarding the specific provision waived, the rationale for granting the waiver, and an estimate of the time needed to resolve the situation. Any waivers approved by DOS PKI PMA are considered changes to the corresponding CP and may result in revocation of the cross-certificate issued to the DOS OPKI Root CA by the FPKIPA.

**1.6 DEFINITIONS AND ACRONYMS**

See Appendix B for acronyms and Appendix C for definitions.

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## 2. PUBLICATION AND REPOSITORY RESPONSIBILITIES

### 2.1 REPOSITORIES

The DOS PKIPO **must** use only repository mechanisms and procedures designed to ensure CA certificates and CRLs are available for retrieval 24 hours a day, 7 days a week, with a minimum of 99% availability overall per year and scheduled down-time not to exceed 0.5% annually<sup>2</sup>.

### 2.2 PUBLICATION OF CERTIFICATION INFORMATION

#### 2.2.1 Publication of Certificates and Certificate Status

The DOS PKIPO **must** operate repositories to support DOS OPKI CA operations. The location of any publication will be one that is appropriate to the certificate-using community, and in accordance with the total security requirements of the Department. The DOS PKIPO **must** ensure interoperability with the FBCA and/or FCPCA repository.

The DOS OPKI CA infrastructure will serve as the primary repository of information for Subscribers and Relying Parties. For all DOS OPKI CAs, this repository is the DOS directory infrastructure operated by DT/Enterprise Network Management (ENM).

The DOS PKIPO web site, <https://usdos.sharepoint.com/sites/ES-IS/ICAM/PKI/>, serves as the primary repository to publish information. Network directories and all other repositories used to disseminate relevant information will:

- Maintain availability necessary to distribute current certificate information in a manner consistent with the posting and retrieval stipulations of this CP Section and the appropriate CA CPS
- Implement access controls and communication mechanisms on all CA repositories to provide sufficient protection as described in Section 5.1.2.

The DOS PKIPO may use a variety of mechanisms for posting information into a repository as **required** by this CP. These mechanisms at a minimum **must** include:

- A Directory Server System that is accessible through the Hypertext Transfer Protocol (HTTP) and Lightweight Directory Access Protocol (LDAP)
- Availability of the information as required by the certificate information posting and retrieval stipulations of this CP
- Access control and communication mechanisms when needed to protect repository information as described in later sections.

CA and End Entity certificates **must** contain valid Uniform Resource Identifiers (URIs) that are publicly accessible, for the purposes of certification path building and for revocation checking.

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<sup>2</sup> Where repository systems are distributed, the availability figures apply to the system as a whole, rather than each component; and availability targets exclude network outages.

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The DOS PKI **must** publish all CA certificates it issues in a file available via a publicly accessible HTTP URI. This URI **must** be asserted in the SIA extension in all valid certificates issued to the CA. The file **must** be a certs-only Cryptographic Message Syntax file that has an extension of .p7c.

Except for self-signed certificates, all CA certificates **must** be published by the Subject CA in a file available via a publicly accessible HTTP URI. This URI **must** be asserted in the AIA extension in all valid certificates issued by the Subject CA. The file **must** be:

- A certs-only Cryptographic Message Syntax file that has an extension of .p7c, or
- A single DER encoded certificate that has an extension of .cer.

The certs-only Cryptographic Message Syntax format is preferred as it allows flexibility for inclusion of multiple certificates.

CAs **must** publish the latest CRL covering all unexpired certificates via a publicly accessible HTTP URI until such time as all issued certificates have expired. This URI **must** be asserted in the CRL distribution point extension of all certificates issued by that CA, except for OCSP responder certificates that include the id-pkix-ocsp-nocheck extension.

When implemented, a CSS provides status information about certificates on behalf of a CA through on-line transactions in the form of a delegated Online Certificate Status Protocol (OCSP) service, as described in [RFC 6960], to provide on-line status information for Subscriber certificates via a publicly accessible HTTP URI in the AIA extension. The operations of the OCSP service are within the scope of this CP.

Each Root and subordinate CA in the Department of State PKI **must** publish certificates issued or received, and status information, such that it is available over the OpenNet Plus<sup>3</sup> network or other such networks appropriate to a particular “community of interest” and that includes the following:

- Issued certificates that reference this Certificate Policy and have the Key Encipherment bit set in the Key Usage attribute
- All CRLs (optionally, each CA may also utilize an OCSP responder)
- The applicable CA certificates to validate a Subscriber certificate
- All CA certificates issued by or to the CA and CRLs issued by the CA in a repository that is publicly accessible through all URI references asserted in valid certificates issued by that CA

**2.2.2 Publication of CA Information**

The DOS PKIPO **must** publish information concerning the DOS OPKI necessary to support its use and operation.

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<sup>3</sup> The OpenNet Plus network has Internet access.

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A copy of the current DOS OPKI CP **must** be posted on the following publicly available web site <https://pkaps.pki.state.gov/>.

A copy of the FCPF CP is publicly available on the FPKIPA website (<https://www.idmanagement.gov/>).

The DOS PKIPO will not publish the CPS for any DOS OPKI CA as a public document due to the potential sensitivity of operational and security information contained herein. Distribution of the CPS for any DOS OPKI CA is limited to individuals **responsible** for the management, operations, and audit of the DOS OPKI on a need-to-know basis.

Cross-certified CAs and other Relying Parties may request a copy of the CPS for any DOS OPKI CA from the DOS PKI PMA, whose contact information is provided in Section 1.5.2 of this CP. The DOS PKI PMA will review the requests to determine if a copy of the CPS or a redacted copy of the CPS will be provided or not and **shall** notify the requester.

A copy of the most recent DOS OPKI Annual Compliance Audit Letter **must** be available on the following publicly available web site <https://pkaps.pki.state.gov/>.

The DOS PKI PMA **must** send this DOS OPKI CP and subsequent revised DOS OPKI CPs to CMAs that assert this policy within 5 business days of approval. The CMAs will notify Subscribers of any approved changes to the Certificate Policy that directly affect them or their PKI-related responsibilities. (See Section 9.12.2)

**2.2.3 Interoperability**

Where the DOS OPKI CAs publish certificates and CRLs in directories, the directories **must** use standards-based schemas whenever possible for directory objects and attributes in accordance with technical guidance from the FPKI Management Authority. CA and End Entity certificates **must only** contain valid URIs that are accessible by relying parties.

**2.3 TIME OR FREQUENCY OF PUBLICATION**

The DOS PKI PMA **must** make this CP and any subsequent changes to this CP available within 30 days of approval on the following publicly available web site <https://pkaps.pki.state.gov/docs/Statement.html>.

The appropriate DOS OPKI CA will publish certificates following user acceptance as specified in Section 4.4 and proof of possession of private key as specified in Section 3.2.1. Section 4.9 specifies publication requirements for CRLs. The CA **must** publish all information normally published in the repository promptly after such information becomes available. Each PKI CA CPS **must** specify time limits within which it publishes various types of information.

**2.4 ACCESS CONTROLS ON REPOSITORIES**

Each DOS OPKI CA **must** adequately protect any repository information not intended for public dissemination or modification; and **must not** make Subscriber certificates automatically available on any public facing repository.

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The appropriate CPS **must** detail the information in the repository that is exempt from automatic availability, and to whom and the conditions under which the DOS PKI OA may make restricted information available via direct and/or remote access.

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### 3. IDENTIFICATION AND AUTHENTICATION

#### 3.1 NAMING

##### 3.1.1 Types of Names

This CP establishes requirements for both subject distinguished names and subject alternative names.

CA certificates **must** contain a non-null subject Distinguished Name (DN). All RA certificates **must** include a non-NULL subject DN. This CP does not restrict the types of names that can be used.

The table below specifies the naming **requirements** that apply to each level of assurance.

**Table 3-1 Naming Requirements**

| Assurance Level       | Naming Requirements                                                                                      |
|-----------------------|----------------------------------------------------------------------------------------------------------|
| Rudimentary           | Non-Null Subject Name, or Null Subject Name if Subject Alternative Name is populated and marked critical |
| Basic                 | Non-Null Subject Name, and optional Subject Alternative Name if marked non-critical                      |
| Medium (all policies) | Non-Null Subject Name, and optional Subject Alternative Name if marked non-critical                      |
| High                  | Non-Null Subject Name, and optional Subject Alternative Name if marked non-critical                      |

##### 3.1.1.1 Subject Names

Certificates issued to Subscribers **must** include distinguished names that are comprised of a base distinguished name (Base DN) and additional relative distinguished names (RDNs). Base DNs **must** be in either of two forms: a geo-political name or an Internet domain component name.

All geo-political distinguished names **must** use the following Base DN:

- C=US, o=U.S. Government, ou= department, [ou=*structural\_container*]

The organizational unit department is used to specify the federal entity that employs the Human Subscriber or owns the device.

Distinguished names based on Internet domain component names **must** use the following Base DN:

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- dc=gov, dc=org0, [dc=org1], ..., [ dc=orgN], [o=organization], [ou=*structural\_container*]

At a minimum, the org0 domain component **must** appear in the Base DN. The org1 to orgN domain components appear, in order, when applicable, and are used to specify the federal entity that employs the Human Subscriber or owns the device.

The additional organizational unit *structural\_container* in either the geo-political or Internet domain Base DN form is permitted to support local directory requirements, such as differentiation between Human Subscribers and Device Subscribers. This organizational unit **shall not** be employed to further differentiate between subcomponents within an agency.

The distinguished name of the Human Subscriber **must** include a common name (CN) using one of the following formats:

- Base DN, CN=nickname lastname
- Base DN, CN=firstname initial. lastname
- Base DN, CN=firstname initial lastname
- Base DN, CN=firstname middlename lastname
- Base DN, CN=lastname.firstname.middlename

In the first common name format, nickname may be the Human Subscriber's first name, a form of the first name, middle name, or pseudonym (e.g., Jack) by which the Subscriber is generally known. A generational qualifier, such as "Sr." or "III", or agency specific identifiers (e.g., CN=Smith.Johnathon.Paul.1234567890) may be appended to any of the common name formats specified above.

Additional certificate qualifiers may be appended to the common name in order to provide additional context to the certificate's intended usage. The qualifier **must** be preceded by a space followed by a hyphen (e.g., CN=Johnathon P. Smith -Sign).

Distinguished names assigned to federal contractors and other affiliated persons **must** follow one of the name forms identified above with (affiliate) appended to the end of the common name (e.g., CN=Johnathon P. Smith (affiliate)).

The CA may supplement any of the distinguished name forms for Human Subscribers specified in this section by including a dnQualifier, serial number, or user id. When any of these are included, they may appear:

- as part of a multi-valued RDN with the common name, or
- as a distinct RDN that follows the RDN containing the common name

Role-based certificates **must** be issued under *id-state-certpcy-mediumHardware* or *id-state-certpcy-highAssurance* certificate policies, with the use of the *id-state-certpcy-highAssurance* certificate policy phased-out by no later than September 30, 2025.

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Role-based certificates identify a specific role on behalf of which one or more subscribers are authorized to act rather than the subscriber's name.

For Role-based certificates, the common name specifies the role, as follows:

- CN=role name [,department]

Where the [department/agency] is implicit in the role (e.g., Secretary of State), it should be omitted. Where the role alone is ambiguous (e.g., Chief Information Officer) the department/agency **must** be present in the common name. The organizational information in the common name **must** correspond to the organizational unit attributes. Examples of role-based certificate common names may include

- CN=Secretary of State
- CN=On behalf of the Secretary of State
- CN=Office of the Secretary of State

Group certificates **must** be issued under *id-state-certpcy-mediumAssurance* or *id-state-certpcy-mediumHardware* certificate policies.

For Group certificates, the common name specifies the group, as follows:

- Base DN, CN=group name

where the group name is descriptive for the group, to include group email names (e.g., PKI Support Email). Group certificates **must not** imply that a subject is a single individual (e.g., by asserting a human subscriber name form in any field of the certificate).

The subjectName DN in a Group certificate **must not** imply that the subject is a single individual, e.g., by inclusion of a human name form.

A Device Subscriber name **must** be a unique name for the device and **must not** take the form of a Human Subscriber name. Device Subscriber distinguished names **must** take the following form:

- Base DN, CN=device name

where device name is a descriptive name for the device.

When *id-fpki-common-pivi-cardAuth* is asserted, the certificate's subject distinguished name **must** take the following form:

- Base DN, serialNumber=UUID

This CP does not restrict the subject distinguished names of CA certificates and Delegated OCSP Responder certificates. However, CA certificates and Delegated OCSP Responder certificates **must** have subject distinguished names. CA and Delegated OCSP Responder certificate distinguished names may be either a geo-political name or an Internet domain component name. Geo-political distinguished names **must** be composed of any combination of the following attributes: country; organization; organizational unit; and common name. Internet

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domain component names are composed of the following attributes: domain component; organizational unit; and common name.

CA subject distinguished names may or may not include a common name, for example:

- Base DN, OU=Certification Authorities, OU=Department CA

If included, the common name in the CA certificates should describe the issuer, such as:

- Base DN, OU=Certification Authorities, CN= Department of State AD High Assurance CA

**3.1.1.2 Subject Alternative Names**

Subscriber certificates that contain id-kp-emailProtection in the EKU **must** include a subject alternative name extension that includes a rfc822Name.

Role-based signature certificates, including those that support delegated digital signatures, **must** include at least one subject alternative name extension that uniquely identifies the individual subscriber that controls the private signature key (e.g., rfc822Name or otherName like Microsoft User Principal Name). Another example of a compliant identifier is the full Distinguished Name from the PIV Authentication certificate of the individual who is to be issued the role-based certificate (e.g., the private key holder) that may be included as a directoryName.

**3.1.1.3 Wildcard Certificate Names**

A wildcard certificate is a certificate that contains a wildcard designator (\*) and allows multiple devices to share the same public-private key pair. A wildcard certificate must comply with the following:

- For Device SSL or TLS Subscriber certificate that assert serverAuth in the EKU, wildcard domain names are **only permitted** in the dNSName value if all sub-domains covered by the wildcard fall within the same application, cloud service, or system boundary within the scope of the sponsoring organization,
- For wildcard certificates, the wildcard designator (\*) may be included in the Common Name (CN) in the *Subject* field, if appropriate, but **must** be included in the *subjectAltName* (SAN) extension.
- The name space of the wildcard certificate **must** be specific to restrict the use of the certificate to one distinct application platform (i.e., system) or set of systems designated for a single application or service. For example:
  - The use of third-level agency wildcards, (i.e., immediately to the left of an agency or organization name (\*.agency.gov)), **must** be prohibited to reduce the likelihood that a certificate will overlap multiple systems or services.
  - Third level wildcards are permitted for dNSName dedicated to a specific application (e.g., \*.application\_name.gov or \*.application\_name.sbu).

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Before issuing a serverAuth certificate containing a wildcard, the RA **must** ensure the sponsoring organization has a documented procedure for determining that the scope of the certificate does not infringe on other agency applications.

Additional wildcard certificate requirements are found in Section 3.2.3.4.

The DOS OPKI CPS **must** identify the DOS OPKI CAs authorized to issue wildcard certificates.

**3.1.2 Need for Names to Be Meaningful**

Names used within the Department of State **must** identify the person or object to which assigned in a meaningful way.

The common name in the distinguished name **must** represent the Subscriber in a way that is easily understandable for humans. For Human Subscribers, this will typically be a legal name.

The CA **must** ensure that an affiliation exists between the Subscriber and any organization identified by any component of any name in its certificate. A CA who uses DNs will coordinate with such authority to determine the proper elements for a given Subscriber.

Any CA asserting this policy **must only** sign certificates with subject names from within a namespace approved by the DOS PKI PMA and Department Naming Authority.

When DNs are used, the directory information tree **must** accurately reflect organizational structures.

In addition, the common name **must** represent the Subscriber in a way that is easily understandable for humans.

When DNs are used, the common name **must** respect name space uniqueness requirements and **must not** be misleading. This does not preclude the use of pseudonymous certificates as defined in Section 3.1.3. The subject name in CA certificates **must** match the issuer name in certificates issued by the CA, as required by [RFC 5280].to

**3.1.3 Anonymity or Pseudonymity of Subscribers**

CA certificates **must not** contain anonymous or pseudonymous identities.

The DOS OPKI AD Root CA **must not** issue anonymous certificates. CA certificates issued by the AD Root CA **must not** contain anonymous or pseudonymous identities.

Subordinate CAs may issue pseudonymous certificates to support internal operations.

DNs in subscriber certificates issued by CAs may contain a pseudonym (such as a large number) as long as name space uniqueness requirements are met.

CAs may issue Role-based or Group certificates that identify subjects by their organizational roles. Each identified 'role' or 'group' **must** meet name space uniqueness requirements.

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Rules for interpreting name forms will use the appropriate standard:

- ITU-T X.501 for interpreting distinguished name forms
- IETF RFC 5322 for interpreting e-mail addresses
- Appropriate IETF RFCs for URL and IP addresses, etc.

The applicable certificate profile (see Section 7.1), as established by the Naming Authority, will contain the rules for interpreting that name form. The CPS **must** identify the Naming Authority.

**3.1.5 Uniqueness of Names**

The DOS Naming Authorities **must** enforce name uniqueness across the Department. Wherever practical, AD CAs **must** use X.500 distinguished names allocated by the Department Naming Authority. DOS OPKI CAs and RAs **must** enforce name uniqueness within the authorized X.500 name space. When other name forms are used, they too **must** be allocated such that name uniqueness is ensured for certificates issued by that CA. DOS AD CAs **must** use distinguished names allocated by the Department Naming Authority suitable for the AD operating system.

Each DOS OPKI CA will unambiguously identify each object in the naming hierarchy for the certificate repository using DNs. The DOS Naming Authorities or CAs will ensure that a DN, once assigned, remains unique for the lifetime of the PKI, and will not re-use that name to identify a different entity. Name uniqueness is not violated when multiple certificates are issued to the same entity. For distinguished names, name uniqueness is enforced for the entire name rather than a particular attribute (e.g., the common name).

When other name forms are used, CMAs **must** allocate them, such that name uniqueness is assured across the Department. Each DOS OPKI CA **must** document permitted name forms in its CPS; how the CAs and RAs will interact with the Department Naming Authority; and how CMAs will allocate names within the Subscriber community to guarantee name uniqueness among current and past Subscribers.

The DOS PKI OA **must** investigate and if necessary recommend the correction for any name collisions brought to its attention. The DOS PKI OA **must** coordinate with and defer to the Naming Authority where appropriate.

Where there is a certificate with a wildcard designator in the CN, the PKI **must not** issue any other certificate with a CN that overlaps or is a subset of that namespace.

Wildcard Domain Names are permitted if all sub-domains covered by the wildcard fall within the same application, cloud service, or system accreditation boundary within the scope of the sponsoring organization.

As indicated in Section 3.1.1.3 wildcards **must not** be used in subdomains that host more than one distinct application platform. Wildcard requirements are summarized and verification requirements are in Section 3.2.3.4.

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For role-based certificates, each identified ‘role’ must meet name space uniqueness requirements.

**3.1.6 Recognition, Authentication, and Role of Trademarks**

The CMA **must** investigate and if necessary, recommend the correction for any trademark name collisions brought to its attention. The CMA **must** coordinate with and defer to the Naming Authority where appropriate. The CMA **must** communicate resolutions to all interested parties.

Consistent with Federal Policy, DOS OPKI CAs will not knowingly use, or permit the use of, trademarks in names unless the subject has the rights to use that name.

**3.2 INITIAL IDENTITY VALIDATION**

Certificate applicants **must** communicate application requests for certificates to an authorized RA or LRA via a trustworthy process, but generally in person. An authorized RA, equipped with Registration Authority hardware and software, may communicate authorizations to issue certificates directly to the supporting CA electronically, provided all communication is secure. An LRA, who is not equipped with Registration Authority hardware and software, **must** transmit authorization requests to issue certificates to the appropriate RA by secure means (i.e., digitally signed electronic means, via diplomatic pouch or registered mail, or in person).

**3.2.1 Method to Prove Possession of Private Key**

In the case where the CMA generates the key directly on the Subscriber’s token, or in a key generator that benignly transfers the key to the Subscriber’s token, then the end-entity is presumed to be in possession of the private key at the time of generation or transfer and proof of possession is not required. If the user is not in possession of the token during key generation, the CMA **must** deliver the token to the Subscriber via an accountable method (see Section 6.1.2). The CMA **must** obtain written or electronic (via the PKI system) acknowledgment of receipt from the Subscriber within 21 days of shipment or **must** revoke any certificates issued to that Subscriber. The CMA **must** deliver activation data for the private keys within the token or module to the Subscriber through a separate, secure communication unless the CMA delivers the token or module in person.

When the CMA delivers keyed hardware tokens to Subscribers, they **must** accomplish delivery in a way that ensures that they provide the correct tokens and activation data to the correct people. The CMA **must** maintain a Subscriber token receipt validation record. When any mechanism that includes a shared secret (e.g., a passphrase or PIN) is used, the mechanism **must** ensure that the applicant and the CMA are the only recipients of this shared secret.

In those cases where the Subscriber causes the system to generate keys (e.g., remote emergency renewal), the Subscriber is **required** to prove possession of the private key that corresponds to the public key in the certificate request to the CMA.

In the case where key generation is performed under the CA or RA’s direct control, proof of possession is not required (e.g., key management certificates generated in a system allowing key escrow).

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A DOS OPKI CA may issue certificates directly in the name of an organization rather than an individual for those functions and applications performed on behalf of the organization. The CMA **must** authenticate the identity of any organization that appears as a component of a subject name appearing in a certificate issued by the CA before processing the certificate application. Any organization requesting a certificate **must** have a PKI Sponsor to accept the obligations of the organization. This section pertains only to the authentication and naming of an organization as the subject in a certificate.

Requests for certificates in the name of an organization or group **must** include the necessary identifying data of the Sponsor, the group or organization name, address, and documentation of the existence of the organization. This information will include but is not limited to the following:

- Organization identification and authorization
- Certificate Authority public keys (for subordinate and cross-certified CAs)
- Contact information to enable the CMA to communicate with the PKI Sponsor as required

The CMA **must** verify this information, in addition to the authenticity and authorization of the requesting PKI Sponsor, authenticate the validity of any authorizations to be asserted in the certificate, and verify the source and integrity of the data collected to an assurance level commensurate with the certificate assurance level requested. The CPS **must** specify acceptable measures for authenticating both the organization and PKI Sponsor's identity and authorizations.

The CMA **must** also include his or her own identity information and authentication declaration as outlined in Section 3.2.3. The PKI Sponsor **must** present information sufficient for registration at the level of assurance requested, for both himself or herself and the non-human Entity (i.e., organization or group) requesting a certificate, and **must** authenticate this information in-person as prescribed in Section 3.2.3.

Before issuing subscriber certificates on behalf of an affiliated organization, the issuing CA **must** verify the authority of requesting representatives.

See Section 3.2.3.4 for specific requirements to verify wildcard certificates.

**3.2.3 Authentication of Individual Identity**

For each certificate issued, the CA **must** authenticate the identity of the individual requestor.

In addition to the processes described below, Subscriber certificates may be issued on the basis of an electronically authenticated request, using a valid signature or authentication certificate and associated private key, with the following restrictions:

- The assurance level of the new certificate **must** be the same or lower than the assurance level of the certificate used to authenticate the request.

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- Identity information in the new certificate **must** match the identity information from the signature or authentication certificate.
- The expiration date of the new certificate **must not** exceed the next required initial identity authentication date associated with the certificate used to authenticate the request.
- The next required initial identity authentication date remains unchanged in the event of a new certificate issuance based on electronic authentication.

**3.2.3.1 Authentication of Human Subscribers**

For Subscribers (including all RAs/LRAs and PKI Sponsors of organizations, components, and minors or others not legally competent), the CMA **must** ensure that the applicant's identity information is verified in accordance with this CP, the applicable CPS, and all applicable MOAs. The CMA **must** ensure that the applicant's identity information and public key are adequately bound. For each assurance level, the applicant **must** meet the minimum set of requirements identified in this section. A CMA may use mechanisms of equivalent or stronger assurance if documented in their CPS. The appropriate DOS OPKI CA CPS **must** specify the acceptable procedures for authenticating a Subscriber's identity.

The CMA **must** record the process followed for each certificate. Process information **must** depend upon the certificate's level of assurance and **must** be addressed in the applicable CPS. In addition, the documentation and authentication requirements **must** vary depending upon the level of assurance. At a minimum, process documentation and authentication requirements **must** include the following, depending on the level of assurance for issuance of each certificate:

- Identity of the applicant
- Identity of the person performing the identification and either:
  - A signed declaration by that person that he or she verified the identity of the applicant against official government-issued photo ID as required using the format set forth at 28 U.S.C. 1746 (declaration under penalty of perjury) or comparable procedure under local law, or
  - An auditable record linking the authentication of the person performing the identification to their verification of each Applicant.
- If in-person or supervised remote<sup>4</sup> identity proofing is done, a unique identifying number(s) from the ID(s) of the applicant, or a facsimile of the ID(s)
- If electronic authentication is done, a unique identifying number(s) from the signature or authentication certificate **must** be retained (e.g., certificate, serial number, thumbprint, SKI, public key, etc.)
- The date of the verification, and either:
  - An auditable record indicating the applicant accepted the certificate; or

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<sup>4</sup> The minimum requirements associated with supervised remote identity proofing are described in NIST SP 800-63A, *Enrollment and Identity Proofing Requirement*.

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- A declaration of identity signed by the applicant using a handwritten signature or appropriate digital signature (see Note) and performed in the presence of the person performing the identity authentication, using the format set forth at 28 U.S.C. 1746 (declaration under penalty of perjury) or comparable procedure under local law.

The table below summarizes the identification **requirements** for each level of assurance.

**Table 3-2 Identification Requirements**

| <b>Assurance Level</b> | <b>Identification Requirements</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rudimentary            | No identification requirement; applicant may apply and receive a certificate by providing his or her e-mail address.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Basic                  | <p>Identity may be established by in-person proofing before a Registration Authority or Trusted Agent; or remotely verifying information provided by applicant including ID number and account number through record checks either with the applicable agency or institution or through credit bureaus or similar databases, and confirms that: name, date of birth, address and other personal information in records are consistent with the application and sufficient to identify a unique individual.</p> <p>Address confirmation:</p> <p>a) Issue credentials in a manner that confirms the address of record supplied by the applicant; or</p> <p>b) Issue credentials in a manner that confirms the ability of the applicant to receive telephone communications at a number associated with the applicant in records, while recording the applicant's voice.</p> |
| Medium (all policies)  | <p>Identity <b>must</b> be established by in-person or supervised remote proofing before the Registration Authority, Trusted Agent or an entity certified by a State or Federal Entity as being authorized to confirm identities; information provided <b>must</b> be verified to ensure legitimacy. A trust relationship between the Trusted Agent and the applicant which is based on an in-person antecedent may suffice as meeting the in-person identity proofing requirement. Credentials <b>required</b> are one Federal Government-issued Picture I.D., one REAL ID Act compliant picture ID<sup>5</sup>, or two Non-Federal Government I.D.s, one of which <b>must</b> be a photo I.D. Any credentials presented <b>must</b> be unexpired.</p>                                                                                                                   |

<sup>5</sup> REAL ID Act compliant IDs are identified by the presence of the DHS REAL ID star

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Table 3-2 Identification Requirements

| Assurance Level | Identification Requirements                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High            | <p>Identity established by in-person appearance before the Registration Authority or Trusted Agent; information provided <b>must</b> be checked to ensure legitimacy.</p> <p>Credentials <b>required</b> are either one Federal Government-issued Picture I.D., one REAL ID Act compliant picture ID., or two Non-Federal Government I.D.s, one of which <b>must</b> be a photo I.D. (e.g., Driver's License).</p> |

A CPS **must** indicate what actors, roles, responsibilities, and activities are leveraged when relying on in-person antecedent to support identity proofing (e.g., agreement with a professional organization to use a member identification number and associated provided point of contact information as antecedent, or electronic authentication using a medium or above certificate being traced back to the initial identity proofing event).

**For All Levels:** As an alternative to presentation of identification credentials, the CMA may use other mechanisms of equivalent or greater assurance (such as comparison of biometric data to identities pre-verified to the standards of this policy and obtained via authenticated interaction with secured databases). If databases or other sources are used to confirm applicant attributes, then these sources and associated information sent to the DOS OPKI AD Root CA or subordinate CA **must require**:

- When information is obtained through one or more information sources, an auditable chain of custody **must** be in place
- All data received **must** be protected and securely exchanged in a confidential and tamper evident manner and protected from unauthorized access.

If an applicant is unable to perform face-to-face, either in-person or supervised remote, registration (e.g., a network device), the applicant may be represented by a trusted person already issued a digital certificate by the PKI. The trusted person will present information sufficient for registration at the level of the certificate being requested, for both himself/herself and the applicant for whom the trusted person is representing.

**For Medium and High Assurance:** The CMA **must** establish identity no more than 30 days before initial certificate issuance. Before enabling the applicant's certificate, the CMA **must** personally verify the applicant's identity. Minors and others not legally competent to provide face-to-face registration information alone **must** be accompanied by a person already certified by the DOS OPKI (i.e., a Sponsor), who will present information sufficient for registration at the level of the certificate being requested, for himself or herself, and the accompanied person. Persons not physically capable of providing face-to-face registration information **must** be proxied by a person already certified by the DOS OPKI, who will present information sufficient

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for registration at the level of the certificate requested, for both himself or herself and the person unable to appear himself or herself.

**For the Basic and Medium Assurance Levels:** An Entity certified by a State or Federal Entity as being authorized to confirm identities may perform in-person authentication on behalf of the RA/LRA and may be considered a Trusted Agent. The certified Entity forwards the information collected from the applicant directly to the RA/LRA in a secure manner. Packages secured in a tamper-evident manner by the certified Entity satisfy this requirement; other secure methods are also acceptable. Such authentication does not relieve the RA/LRA of responsibility to verify the presented data.

Certificates that assert the *id-state-certpcy-administratorAuth*, *id-state-certpcy-strongAuth*, or *id-state-certpcy-derived-flacAuth-hardware* certificate policies **must** meet NIST SP 800-63A IAL3 identity proofing requirements<sup>6</sup>.

- Identity proofing **must** be performed in person.
- A biometric sample from the applicant **must** be collected during the identity proofing process and retained to support account recovery, non-repudiation, and establish a high level of confidence that the same participant is present in the proofing and issuance processes (if done separately).
- The biometric sample provided by the applicant **must** be compared to a stored biometric on identity evidence (e.g., the biometric on the applicant's PIV or FLAC credential), or in authoritative records associated with the evidence, and a 1-to-1 match verified.

For Administrator Authentication Certificates, the RA/LRA **must** verify that the applicant is designated to perform system administrator duties within their organization via established organizational processes.

In the event an applicant is denied a credential based on the results of the identity proofing process, a mechanism for appeal or redress of the decision **must** be provided.

### ***3.2.3.2 Authentication of Human Subscribers for Role-Based Certificates***

Roles for which role-based certificates may be issued are **limited** to those that uniquely identify a specific role within an organization.

For pseudonymous role-based certificates that identify certificate subjects by their organizational roles, the RA/LRA **must** validate that the individual requesting the role-based certificate is the current holder of that role.

Role-based certificates **must not** be shared but must be issued to individual subscribers and protected in the same manner as individual certificates. DOS OPKI CAs may issue Role Delegated Digital Signature certificates for a specific role to multiple Subscribers, but the key pair for each certificate **must** be unique.

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<sup>6</sup> Certificates issued by DOS OPKI CAs that assert the *id-fpki-common-derived-pivAuth-hardware* certificate policy, defined by the current Federal Common Policy Framework Certificate Policy, must also meet these requirements.

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DOS OPKI CAs **must only** issue role-based certificates to persons holding a currently valid DOS-issued PIV credential. The Role Holder, who is the Sponsor for role-based certificates associated with that role, **must** hold an individual certificate in his/her own name issued by the same DOS OPKI at the same or higher assurance level as the role-based certificate requested. If the Sponsor requests the issuance of the Role Delegated Digital Signature certificates to additional Subscribers, each of the Subscribers must have a currently valid DOS-issued PIV credential.

The procedures for issuing role-based certificate and tokens **must** comply with all other stipulations of this CP (e.g., key generation, private key protection, and Subscriber obligations).

The issuing Subordinate DOS OPKI CA and/or RAs/LRAs **must** record the information identified in Section 3.2.3.1 for the PKI Sponsor associated with the role, i.e., the Role Holder, before issuing a role-based certificate. The RA/LRA **must** validate the identity of the PKI Sponsor by requiring the Sponsor to submit a request for the issuance of the role-based certificate(s) that is digitally signed using the Sponsor's currently valid PIV credential issued by the DOS OPKI.

Prior to issuance of a Role Delegated Digital Signature certificate, authentication of both the Role Holder and the Role Delegated Digital Signature private key holder is **required**. This authentication can be performed either through the same procedures for authentication of individual identity (see Section 3.2.3.1) or using the Role Holder's and Subscriber's currently valid PIV credential issued by the DOS OPKI.

If the individual who is the Role Holder changes, the new Role Holder **must** review the status of each holder of a role-based certificate associated with that role to ensure that they are still authorized to act in that role and are **required** to have the certificates. The new Role Holder, who is the Sponsor, **must** promptly notify a RA/LRA of the change in Role Holder (Sponsor), and re-affirm the ongoing need for such certificates via an email digitally signed using their currently valid PIV credential issued by the DOS OPKI and/or in-person.

The applicable CPS **must** describe procedures to ensure that accountability is maintained; and describe the procedures for modification or revocation, in accordance with the relevant sections of this CP.

**3.2.3.3 Authentication of Human Subscribers for Group Certificates**

Normally, DOS CAs **must** issue a certificate to a single Subscriber. For cases where there are several entities acting in one capacity, and where non-repudiation for transactions is not required, a certificate may be issued that corresponds to a private key that is shared by multiple Subscribers. Subordinate DOS OPKI CAs and/or RA/LRAs **must** record the information identified in Section 3.2.3.1 for a Sponsor, from the organization's Information Systems Security Office or equivalent, before issuing a Group certificate. The RA/LRA **must** validate the identity of the Sponsor by requiring the Sponsor to submit a request for the issuance of the Group certificate that is digitally signed using the Sponsor's currently valid DOS-issued PIV credential.

In addition to the authentication of the Sponsor, the following applies to group certificates:

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- The Group Sponsor **must** assign the subject DN and SAN of the group encryption certificate. The *subjectName* DN **must not** imply that the subject is a single individual, e.g. by inclusion of a human name form.
- The Group Sponsor **must** ensure that each group member has signed an individual Shared Key Usage Agreement
- The Group Sponsor **must** maintain a list of subscribers with access to the shared private key at all times. This list **must** be provided to an authorized representative of the CA, RA, or an auditor upon request or at certificate revocation or expiration (see Section 9.6.3.2).
- The Group Sponsor **must** ensure that only Subscribers that have a currently valid DOS-issued PIV credential are allowed access to use the private key
- The procedures for issuing tokens for use in shared key applications **must** comply with all other stipulations of this CP (e.g., key generation, private key protection, and Subscriber obligations)
- Group certificates **must only** be issued to groups under the Sponsor's control.

In case a human Group Sponsor changes, the new Sponsor **must** review the status of each group under his/her sponsorship to ensure that it is still authorized to receive and required to have certificates and **must** notify the CMA of the change in sponsorship and re-affirm the information outlined above via digitally signed email and/or in-person.

The applicable CPS must describe procedures to ensure that certificate accountability is maintained.

**3.2.3.4 Authentication of Devices**

Some computing and communications components (routers, firewalls, servers, etc.) and software applications will be named as certificate subjects. In such cases for all assurance levels, the component **must** have a human PKI Sponsor who is affiliated with the DOS. The Sponsor is **responsible** for the security of the private key and for providing the following registration information as prescribed in the applicable DOS OPKI CA CPS.

In the case of computing and communications components (equipment), this information **shall** include but is not limited to the following:

- Equipment or application organizational ownership and authorization to request certificates
- Equipment identification (e.g., serial number) or service name (e.g., DNS name) or unique software application name
- Equipment or software application public keys
- Equipment or software application authorizations and attributes (if any are to be included in the certificate)
- Contact information to enable the CA or RA to communicate with the Sponsor when required, and acceptance of sponsorship responsibilities

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The CMA **must** authenticate the validity of any authorizations asserted in the certificate and **must** verify source and integrity of the data collected to an assurance level commensurate with the certificate assurance level requested. For certificates issued at the *mediumDevice* or *mediumDeviceHardware* certificate policy, the CMA **must** verify registration information for the device/application and the PKI Sponsor commensurate with the Medium assurance level. The CMA **must** also include his or her own identity information and authentication declaration as outlined in Section 3.2.3.1. The PKI Sponsor will present information sufficient for registration at the level of assurance requested, for both himself or herself and the non-human Entity (e.g., equipment, groups) requesting a certificate. The PKI Sponsor **must** authenticate this information in person and/or via a digitally signed email to the CMA using the Sponsor's previously issued DOS OPKI certificate asserting the same or higher level of assurance as that being requested, as prescribed in Section 3.2.3.1.

The registration information **must** be verified to an assurance level commensurate with the certificate assurance level being requested. For certificates that assert a certificate policy mapped to the *id-fpki-certpcy-mediumDevice* or *id-fpki-certpcy-mediumDeviceHardware* policies, registration information **must** be verified commensurate with the Medium assurance level. Acceptable methods for performing this authentication and integrity checking include, but are not limited to the following:

- Verification of digitally signed messages sent from the Sponsor (using certificates of equivalent or greater assurance than that requested)
- In person or supervised remote registration by the Sponsor, with the identity of the Sponsor confirmed in accordance with the requirements of Section 3.2.3.1

Component certificates **must** be issued only to devices/applications under the Sponsor's control, or where the Sponsor has delegated to an authorized administrator for the device/application the responsibility to protect the device/application's private key and to ensure that the device/application's certificate is only used for authorized purposes. In case a human Sponsor changes, the new Sponsor **must** review the status of each component certificate under his/her sponsorship to ensure that it is still authorized to receive and required to have certificates and **must** notify the CMA of the change in sponsorship and re-affirm the information outlined above via digitally signed email and/or in-person. The applicable CPS **must** describe procedures to ensure that certificate accountability is maintained. See Section 9.6.3 for Subscriber responsibilities.

A complete list of wildcard certificate requirements are found in Sections 3.1.1.3 and 3.1.5. A summary of requirements specific to wildcard certificates:

Only device SSL or TLS certificates that assert *serverAuth* in the EKU may contain a wildcard designator (\*). The authorized human PKI Sponsor **must** submit the request for a wildcard certificate, identifying the system or device, and providing other required information, to an authorized RA.

For wildcard certificates, the RA **must** verify:

- The business and technical justification that necessitates the use of the wildcard certificate.

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- The approved existence of the system or device
- The identity of the Sponsor via a DOS-issued signature certificate, issued at mediumHardware or above, on a PIV Card (preferred), a Secure Network Access with PKI (SNAP) smart card, or YubiKey token
- The authority of the PKI Sponsor to request a system or device wildcard certificate
- The authority of the PKI Sponsor to control and manage the wildcard namespaces
- The entire wildcard namespace is under the control of the PKI Sponsor, and
- Any attributes asserted by the system or device wildcard certificate.

For wildcard certificates, the RA **must** sign a declaration acknowledging that they have verified the identity and any attributes contained in the certificate in accordance with this policy.

For wildcard certificates, the RA **must** vet the Request against all requirements, document and report the results to the DOS PKI OA. For requests for wildcard certificates for publicly trusted DOS servers the RA **must** recommend to the DOS PKI OA whether the certificate should be issued by a DOS OPKI CA authorized to issue wildcard certificates, or by a trustworthy commercial PKI service. The RA **must** recommend approval/disapproval of the request.

For wildcard certificates, the DOS PKI OA **must** approve or disapprove the Request. If approved, the RA **must** complete the wildcard certificate issuance process as approved, i.e.:

- By issuing the requested certificate from a DOS OPKI CA authorized to issue wildcard certificates, or
- By providing guidance to the PKI Sponsor to obtain the certificate from a trusted commercial PKI service provider.

The PKI Sponsor **must** be accountable for the system or device wildcard certificate and **must** acknowledge and accept overall responsibility for the use of the system or device wildcard certificate and protection of all copies of the associated private key.

**3.2.4 Non-verified Subscriber Information**

Except for the rudimentary assurance level, all Subscriber information included in certificates **must** be verified.

**3.2.5 Validation of Authority**

For cross-certification, the DOS PKI OA **must** validate the representative's authorization to act in the name of the organization and include such verification in the recommendation to the DOS PKI PMA.

Before issuing a Role Holder Digital Sign- certificate, the RA **must** verify that the person requesting the certificate is the sole person currently appointed to that role.

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Before issuing a Role Delegated Digital Signature certificate to the person who will receive the token containing the delegated digital signature certificate and private signature key, the RA **must** verify that the Role Holder has authorized the individual identified in the certificate to sign on behalf of the role or the person appointed to the role.

Before issuing a group certificate, the RA **must** verify the requestor's authority to act in the name of the group.

**3.2.6 Criteria for Interoperation**

The DOS PKI PMA **must** determine the criteria for cross-certification with other Entities in accordance with Section 1.1.5 and the *Federal Public Key Infrastructure Bridge Application Process Overview* document, and the *Federal Public Key Infrastructure Annual Review Requirements* [AUDIT] document. Under no circumstances **must** any certificate have more than one intentional trust path to the FBCA.

Practice Note: Multiple trust paths created as a result of certificate renewal or CA rekey do not violate the single trust path requirement above.

**3.3 IDENTIFICATION AND AUTHENTICATION FOR RE-KEY REQUESTS****3.3.1 Identification and Authentication for Routine Re-Key**

Re-keying a certificate means that the CMA creates a new certificate that has the same characteristics and level as the old one, except that the new certificate has a new, different public key (corresponding to a new, different private key) and a different serial number and possibly different validity period.

If a DOS OPKI AD Root CA re-key is required, a new cross-certificate **must** be requested from the FPKIPA. For any subordinate DOS OPKI CA that requires a re-key, the DOS OPKI AD Root CA will issue its new certificate.

Subscribers **must** periodically obtain new keys and re-establish identity as defined in Section 3.2. A DOS OPKI CA may re-key Subscribers based on electronically authenticated Subscriber requests. Subscribers **must** stop using private keys before the public key expires. Decryption private keys do not have a lifetime so Subscribers may use these keys at any time to decrypt information.

PKI Sponsors for Role, Group, and Device certificates **must** also periodically obtain new keys and re-establish identity as defined in Section 3.2. A DOS OPKI CA **must** re-validate the existence of the role or group; the PKI Sponsor's membership in the role or group; the authority of the PKI Sponsor to either hold or exercise the authority of the role or group; and the validity of the PKI Sponsor's personal certificates. For Device certificates, a DOS OPKI CA **must** re-validate the identification and ownership of the device; the continued need for the certificate; the validity of any authorizations asserted in the certificate; and the validity of the requesting PKI Sponsor's authority to make the request and of his/her personal certificates.

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Subscribers of DOS OPKI CAs **must** identify themselves for the purpose of re-keying as required in the table below:

**Table 3-3 Subscriber Routine Re-Key Identity Requirements**

| Assurance Level       | Routine Re-key Identity Requirements for Subscriber Signature, Authentication and Encryption Certificates                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rudimentary           | Identity may be established through use of current signature key.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Basic                 | Identity may be established through use of current signature key, except that identity <b>must</b> be reestablished through initial identity validation process at least once every 15 years from the time of initial registration.                                                                                                                                                                                                                                                                                |
| Medium (all policies) | <p>Identity may be established through use of current signature key, except that identity <b>must</b> be established through initial identity validation process at least once every twelve (12) years from the time of initial registration.</p> <p>For certificates asserting policies mapped to id-fpki-certpcy-mediumDevice or id-fpki-certpcy-mediumDeviceHardware, identity may be established through the use of the device's current signature key or the signature key of the device's human sponsor.</p> |
| High                  | Identity may be established through use of current signature key, except that identity <b>must</b> be established through initial identity validation process at least once every three years from the time of initial registration.                                                                                                                                                                                                                                                                               |

If DOS implements the capability of associating authorizations with a certificate, including any conveyed or implied by the subject's DN, the Subscriber and/or the Subscriber's organization **must** notify the appropriate CAs of the withdrawal of authorization. The CPS **must** document the mechanisms used to notify the appropriate CAs of this action. In such instances, withdrawal of authorization may result in revocation of the old certificate and, if necessary, the issuance of a new certificate with a different public key and the appropriate associated authorizations.

### 3.3.2 Identification and Authentication for Re-key after Revocation

For all levels of assurance, Subscribers requesting certificates after revocation, other than during a renewal or update action, **must** go through the initial identity authentication and registration requirements, as indicated in Section 3.2 to obtain a new certificate.

## 3.4 IDENTIFICATION AND AUTHENTICATION FOR REVOCATION REQUESTS

The CMA **must** authenticate revocation requests in accordance with Section 4.9.3. The CMA may authenticate requests to revoke a certificate using signatures generated with that certificate's associated private key, regardless of whether or not the private key has been compromised.

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### 3.5 IDENTIFICATION AND AUTHENTICATION FOR KEY RECOVERY REQUESTS

The DOS OPKI supports key escrow and recovery of private decryption keys.

#### 3.5.1 KRA Authentication

The KRA **must** authenticate to the KED directly or using a public key certificate issued by the associated DOS OPKI. The assurance level of the certificate **must** be the same as or greater than that of the certificate whose corresponding private key is being recovered and **must** meet the requirements of an RA credential.

#### 3.5.2 KRO Authentication

The KRO **must** authenticate to the KRA using a public key certificate issued by the associated PKI. The assurance level of the certificate **must** be the same as or greater than that of the certificate whose corresponding private key is being recovered and **must** meet the requirements of an RA credential.

#### 3.5.3 Subscriber Authentication

The Subscriber identity **must** be established as specified in Section 3.3.1 above. Alternatively, if the authentication cannot be verified using a public key certificate issued by the associated DOS OPKI whose assurance level is the same as or greater than that of the certificate whose corresponding private key is being recovered, then the identity validation can use the steps outlined in Section 3.2.3.1.

For automated self-recovery, the Subscriber **must** be authenticated to the KED using a valid public key certificate. The assurance level of the Subscriber certificate **must** be equal to or greater than that of the certificate whose corresponding private key is being recovered.

#### 3.5.4 Third-Party Requestor Authentication

The KRA or KRO **must** verify the identity and authorization of the Requestor prior to initiating the key recovery request.

Third-Party Requestor identity authentication **must** be commensurate with the assurance level of the certificate associated with the key being recovered. Identity **must** be established using one of the following methods:

- Procedures specified in Section 3.2.3 for authentication of an individual identity during initial registration for the specified certificate policy assurance level (an assurance level equal to or greater than the assurance level of the certificate whose corresponding private key is being recovered).
- Certificate-based authentication (e.g., digitally signed e-mail or client-authenticated TLS) that can be verified using current, valid (i.e., un-revoked) public key certificates at the requested certificate policy assurance level (an assurance level equal to or greater than

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the assurance level of the certificate whose corresponding private key is being recovered).

**3.5.5 Data Decryption Server Authentication**

The DOS OPKI has not implemented a Data Decryption Server.

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## 4. CERTIFICATE LIFE-CYCLE OPERATIONAL REQUIREMENTS

### 4.1 CERTIFICATE APPLICATION

The Certificate application process **must** provide sufficient information to:

- Establish the Applicant's authorization by the employing or sponsoring agency to obtain a certificate. See Section 3.2.3 for requirements.
- Establish and record the identity of the Applicant. See Section 3.2.3 for requirements.
- Obtain the Applicant's public key and verify the Applicant's possession of the private key. See Section 3.2.3 for requirements.
- Verify the information included in the certificate.

These steps may be performed in any order that does not defeat security, but all **must** be completed before certificate issuance.

This section specifies requirements for initial application for certificate issuance.

The DOS OPKI AD Root CA may issue end-entity certificates to trusted DOS PKIPO personnel where necessary for the internal operations of the PKI AD Root CA. The DOS OPKI AD Root CA does not issue end-entity certificates for any other reasons.

#### 4.1.1 Who Can Submit a Certificate Application

For the DOS OPKI AD Root CA, the DOS PKI PMA **must** submit the cross-certificate application to the FPKIPA.

For subordinate DOS OPKI CAs, the DOS PKI OA **must** submit requests for subordinate PKI CA certificates from the DOS OPKI AD Root CA to the Department of State DOS PKI PMA using the contact information provided **in** Section 1.5.2.

External entities seeking cross-certification with the DOS OPKI **must** submit requests for a cross-certificate from the OpenNet AD Root CA to the Department of State DOS PKI PMA using the contact information provided **in** Section 1.5.2.

Subscriber applicants **must** follow the procedures in Section 4.2 of this CP and the applicable CPS.

For Wildcard Certificates, the DOS PKIPO **must** develop, and the CMA **must** enforce policies and procedures for determining:

- Who can be a PKI Sponsor for a wildcard certificate and for managing the wildcard namespace
- Who can authorize a PKI Sponsor's control over the wildcard namespace.

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For wildcard certificates, the DOS PKIPO **must** ensure that the Sponsor has documented mechanisms to manage and control the wildcard certificates and associated private keys.

**4.1.2 Enrollment Process and Responsibilities**

All communications supporting the certificate application and issuance process **must** be authenticated and protected from modification. Communications may be electronic or out-of-band.

Any electronic communication of shared secrets **must** be protected.

Where electronic communications are used, cryptographic mechanisms commensurate with the strength of the public/private key pair **must** be used.

Out-of-band communications **must** protect the confidentiality and integrity of the data.

Subscribers are **responsible** for providing accurate information on their certificate applications.

If databases or other sources are used to confirm Subscriber attributes, then these sources and associated information sent to a CA **require**:

- An auditable chain of custody be in place when information is obtained through one or more information sources
- All data received be protected and securely exchanged in a confidential and tamper evident manner and protected from unauthorized access.

Within the Department, only the DOS OPKI AD Root CA may apply for cross-certification with the FBCA and/or FCPCA, using the procedures outlined in the FBCA and/or FCPCA CP, the *Federal Public Key Infrastructure Bridge Application Process Overview* document, and the MOA.

Only the DOS OPKI AD Root CA **shall** cross-certify with external CAs or establish subordinate CAs. A Certification Practices Statement, written to the format of the *Internet X.509 Public Key Infrastructure Certificate Policy and Certification Practices Framework* [RFC 3647] **must** accompany all such requests. Entities applying for cross-certification are **responsible** for providing accurate information on their certificate applications.

Upon issuance of a cross-certificate or a DOS OPKI subordinate CA certificate, the DOS PKI CMA **must** manually check each certificate issued to the CA by the DOS OPKI AD Root CA to ensure the proper population of each field and extension with the correct information before delivering the certificate to the External Entity CA or DOS OPKI subordinate CA.

All CMAs **must** conform to the CPS as written for the applicable CA. All CMAs **must** authenticate, and protect from modification, communications among PKI authorities supporting the certificate application and issuance process.

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**UNCLASSIFIED****4.2 CERTIFICATE APPLICATION PROCESSING**

The RA **must** verify the accuracy of information in certificate applications, using procedures specified in this CP and the applicable CPS, before the certificates are issued.

**4.2.1 Performing Identification and Authentication Functions**

For the DOS OPKI AD Root CA, the DOS PKI OA **must** validate acceptance of applicant identification and authentication.

For subordinate DOS OPKI CAs, the identification and authentication of the Subscriber **must** meet the requirements specified for Subscriber authentication as specified in Sections 3.2 and 3.3 of this CP. The applicant and the supporting CMA **must** perform the steps outlined in the applicable CPS when an applicant applies for a certificate. This CP identifies the components of the DOS OPKI (e.g., CA or RA) that are responsible for authenticating the Subscriber's identity in each case.

RAs **must** authenticate and protect from modification all communications supporting the certificate application and issuance process using mechanisms commensurate with the protection requirements of the data. RAs **must** protect from unauthorized disclosure any electronic transmission of this data (i.e., encryption) commensurate with the protection requirements of the data.

**4.2.2 Approval or Rejection of Certificate Applications**

The DOS PKI PMA may require an initial compliance audit to ensure that the DOS OPKI CAs and other Entity CAs are prepared to implement all aspects of their applicable CPS, before authorizing the DOS OPKI OA to issue and manage certificates asserting Department of State certificate policies. DOS OPKI CAs **must only** issue certificates asserting Department of State certificate policies and authorized Federal Common Policy OIDs upon receipt of written notification from the FPKIPA authorizing them to do so.

The DOS PKI OA and RAs/LRAs may reject any Subscriber, group, role-based, or device certificate application that is incomplete, or that contains information that they cannot verify as accurate in accordance with Section 4.2.1. The CMA may afford Subscribers and Sponsors the opportunity to correct, complete and augment application information. Failure to do so will result in rejection of the application for the certificates. The CMA **must** submit a report via protected communications to the DOS PKI OA, outlining the circumstances for rejection and providing full identifying data about the applicant (i.e., the Subscriber or the Sponsor for group, role or device/application certificates).

For Device certificates, the CA **must** reject a certificate request if the requested Public Key has a known weak Private Key. Public key parameters generation and quality checking, **must** be conducted in accordance with Section 6.1.6 of this CP.

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**UNCLASSIFIED****4.2.3 Time to Process Certificate Applications**

CMAs **must** identify and authenticate Subscribers, organizations, components, and PKI Sponsors not more than 30 days prior to certificate issuance. Otherwise, the CMA **must** re-confirm the identity to ensure issuance of the certificates to the appropriate individual.

**4.3 CERTIFICATE ISSUANCE****4.3.1 CA Actions During Certificate Issuance**

It is the **responsibility** of the CMA to verify that the certificate information is correct and accurate. The RAs **must** check all CA certificates to ensure that all fields and extensions are properly populated.

Upon receiving the request, CMA **must**:

- Verify the identity of the requestor
- Verify the authority of the requestor and the integrity of the information in the certificate request
- Verify all attribute information received from a Subscriber before inclusion in a certificate
- Build and sign a certificate if all certificate requirements have been met (in the case of an RA, have the CA sign the certificate)
- Make the certificate available to the Subscriber after confirming that the Subscriber has formally acknowledged the obligations described in Section 9.6.3.

The CMA **must not** sign any certificate until the RA and/or LRA have completed all verifications and modifications, if any, to the CA's satisfaction, and the identification and authentication process set forth in the CP and appropriate CPS are complete. If an RA or LRA denies a certificate request, then the CA **must not** sign the requested certificate.

CMAs **must** verify all authorization and other attribute information received from an applicant. In most cases, the RA or LRA is **responsible** for verifying applicant data, but if CAs accept applicant data directly from applicants, then the CA is **responsible** for verifying the applicant data. The RA **must** verify information regarding attributes via those offices or roles that have authority to assign the information or attribute. The applicable CPS **must** describe these processes and relationships.

**4.3.2 Notification to Subscriber by the CA of Issuance of Certificate**

The DPS PKI PMA **must** notify external entities of cross-certificate issuance, and the CMAs for DOS Subordinate CAs of subordinate CA certificate issuance.

Where notification is not an integral component of the issuance process (e.g., when individual is present as the certificate is generated on their token), DOS OPKI CAs **must** notify Subscribers and Sponsors that certificates have been generated.

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**UNCLASSIFIED****4.4 CERTIFICATE ACCEPTANCE**

For Rudimentary assurance, there is no stipulation.

For all other assurance levels, before a CA provides a Subscriber or Sponsor with the private key and allows its effective use:

- The CMA **must** convey the Subscriber's responsibilities to the Subscriber (and/or the Sponsor in the case of group, role-based and device certificates), as defined in Section 9.6.3
- The CMA **must** require and document the Subscriber's acceptance (and/or the Sponsor's acceptance in the case of group, role-based and device certificates) of those responsibilities

The CPS **must** identify specific steps for conveying and documenting the acceptance of Subscriber and Sponsor responsibilities.

**4.4.1 Conduct Constituting Certificate Acceptance**

Failure to object to the certificate or its contents **shall** constitute acceptance of the certificate.

**4.4.2 Publication of the Certificate by the CA**

As specified in 2.2.1, each DOS OPKI CA **must** publish all CA and Subscriber certificates in certificate repositories accessible to Relying Parties.

FLAC certificates that contain the FASC-N or card UUID in the SAN extension, i.e., FLAC authentication certificates and FLAC card authentication certificates, **must not** be distributed via public repositories.

**4.4.3 Notification of Certificate Issuance by the CA to Other Entities**

The DOS PKI PMA **must not**ify the FPKIPA, and other entities cross-certified with the DOS OPKI AD Root CA, at least two weeks prior to the issuance of a new DOS OPKI CA certificate or upon issuance of an External Entity CA cross-certificate. In addition, all new artifacts (CA certificates, CRL DP, AIA and/or SIA URLs, etc.) produced because of the CA certificate issuance **must** be provided within 24 hours following issuance. The process for notifying the FPKIPA is included in the MOA.

The DOS PKI OA **must** notify DOS PKI CMAs responsible for all DOS OPKI Subordinate CAs at least two weeks prior to the DOS OPKI AD Root CA issuing a new DOS OPKI CA certificate or a new External Entity CA cross-certificate. In addition, all new artifacts (CA certificates, CRL DP, AIA and/or SIA URLs, etc.) produced because of the CA certificate issuance **must** be provided within 24 hours following issuance.

**UNCLASSIFIED****4.5 KEY PAIR AND CERTIFICATE USAGE****4.5.1 Subscriber Private Key and Certificate Usage**

For Rudimentary assurance, this CP makes no stipulation.

For all other assurance levels, Subscribers **must** protect their private keys from access by other parties. Section 1.4 describes authorized and prohibited uses of PKI certificates.

DOS OPKI CAs **must** specify restrictions in the intended scope of usage for a private key through certificate extensions, including the key usage and extended key usage extensions, in the associated certificate.

**4.5.2 Relying Party Public Key and Certificate Usage**

Certificates issued by DOS OPKI CAs **must** specify restrictions on their use through critical certificate extensions, including the basic constraints and key usage extensions.

DOS OPKI CAs **must** issue CRLs specifying the current status of all unexpired certificates.

Relying Parties should process certificate and certificate status information as specified in [X.509] when relying on DOS OPKI certificates.

**4.6 CERTIFICATE RENEWAL**

Renewing a certificate means creating a new certificate with a new serial number where all certificate subject information, including the subject public key and subject key identifier, remain unchanged.

The new certificate may have an extended validity period and may include new issuer information (e.g., different CRL distribution point, AIA and/or be signed with a different issuer key).

Once renewed, the old certificate may or may not be revoked, but **must not** be used for requesting further renewals, re-keys, or modifications.

**4.6.1 Circumstance for Certificate Renewal**

The DOS Subordinate CAs **must** not renew Subscriber certificates issued under the FCPF CP.

DOS Subordinate CA certificates that are only issued under this CP **shall** only be renewed if the public key has not reached the end of its validity period, the associated private key has not been compromised, and the Subscriber name and attributes are unchanged. In addition, the validity period of the certificate **must** meet the requirements specified in Section 6.3.2.

CA certificates and Delegated OCSP responder certificates **shall** only be renewed if the aggregated lifetime of the private key does not exceed the requirements specified in Section 6.3.2.

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**UNCLASSIFIED****4.6.2 Who may Request Renewal**

The DOS may request renewal of the DOS OPKI AD Root CA's cross-certificate from the FPKI.

External Entity PKIs cross-certified with the DOS OPKI may request renewal of the cross-certificate from the DOS OPKI.

For other CA certificates and Delegated OCSP responder certificates, the corresponding operating authority may request renewal.

For DOS OPKI CAs that support renewal, subscriber renewal requests **must** be accepted only from certificate subjects, PKI sponsors or RAs. Additionally, a CA may perform renewal of its subscriber certificates without a corresponding request, such as when the CA re-keys.

**4.6.3 Processing Certificate Renewal Requests**

For the DOS OPKI AD Root CA, certificate renewal for reasons other than re-key of the DOS OPKI AD Root CA **must** be approved by the DOS PKI PMA.

When a CA re-keys, it may renew the certificates it has issued.

When certificates are renewed as a result of CA key compromise, as described in Section 4.6.1, the CA or RA **must** verify all certificates issued since the date of compromise were issued appropriately. If the certificate cannot be verified, then it **must not** be renewed.

**4.6.4 Notification of New Certificate Issuance to Subscriber**

The DPS PKI PMA **must** notify external entities of cross-certificate renewal, and the CMAs for DOS Subordinate CAs of subordinate CA certificate renewal.

Where notification is not an integral component of the renewal process (e.g., when individual is present as the certificate is generated on their token), DOS OPKI CAs **must** notify Subscribers and Sponsors that certificates have been renewed.

**4.6.5 Conduct Constituting Acceptance of a Renewal Certificate**

Failure to object to the renewed certificate or its contents **shall** constitute acceptance of the certificate.

**4.6.6 Publication of the Renewal Certificate by the CA**

As specified in 2.2.1, each DOS OPKI CA **must** publish all CA and Subscriber certificates in certificate repositories accessible to Relying Parties.

FLAC certificates that contain the FASC-N or card UUID in the SAN extension, i.e., FLAC authentication certificates and FLAC card authentication certificates, **must not** be distributed via public repositories.

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**UNCLASSIFIED****4.6.7 Notification of Certificate Issuance by the CA to Other Entities**

The DOS PKI PMA **must** notify the FPKIPA, and other entities cross-certified with the DOS OPKI AD Root CA, at least two weeks prior to the issuance of a new DOS OPKI CA certificate or upon issuance of an External Entity CA cross-certificate. In addition, all new artifacts (CA certificates, CRL DP, AIA and/or SIA URLs, etc.) produced because of the CA certificate issuance **must** be provided within 24 hours following issuance. The process for notifying the FPKIPA is included in the MOA.

The DOS OPKI OA **must** notify DOS PKI CMAs responsible for all DOS OPKI Subordinate CAs at least two weeks prior to the DOS OPKI AD Root CA issuing a new DOS OPKI CA certificate or a new External Entity CA cross-certificate. In addition, all new artifacts (CA certificates, CRL DP, AIA and/or SIA URLs, etc.) produced because of the CA certificate issuance **must** be provided within 24 hours following issuance.

**4.7 CERTIFICATE RE-KEY**

Re-keying a certificate consists of creating a new certificate with new serial number and a different public key while retaining the remaining contents of the old certificate that describe the subject. The new certificate may be assigned a different validity period, key identifiers, specify a different CRL distribution point, and/or be signed with a different key.

Once re-keyed, the old certificate may or may not be revoked, but **must not** be reused for requesting further renewals, re-keys, or modifications.

Subscribers of DOS OPKI CAs **must** identify themselves for the purpose of re-keying as required in Section 3.3.1.

In the event that re-key of the DOS OPKI AD Root CA is required, the DOS PKI PMA **must** notify the FPKIPA and request a new cross-certificate from the FPKIPA in accordance with this CP and the MOA. The DOS PKI PMA **must** also notify external entities cross-certified with the DOS OPKI AD Root CA and arrange for the issuance of new cross-certificates in accordance with this CP and the applicable MOAs.

In the event that re-key of a DOS OPKI Subordinate CA is required, the DOS PKI PMA **must** notify the FPKIPA in accordance with this CP and the MOA. The DOS PKI PMA **must** also notify external entities cross-certified with the DOS OPKI AD Root CAs in accordance with this CP and the applicable MOAs. The Subordinate CA's CMA **must** request authorization of the DOS PKI OA to receive a new Subordinate CA certificate from the DOS OPKI AD Root CA.

**4.7.1 Circumstance for Certificate Re-Key**

Circumstances **requiring** certificate re-key include nearing the maximum usage period of a private key, certificate expiration, loss or compromise, issuance of a new hardware token, and hardware token failure.

Section 6.3.2 establishes maximum usage periods for private keys for both CAs and Subscribers.

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**UNCLASSIFIED****4.7.2 Who May Request Certification of a New Public Key**

The DOS PKI PMA may request the re-key of the DOS OPKI AD Root CA resulting in a new self-signed certificate for the new public key.

The DOS PKI PMA may request cross-certification of a new public key for a re-keyed DOS OPKI AD Root CA by the FPKIPA under a currently valid MOA.

The DOS PKI PMA may request cross-certification of a new public key for a re-keyed DOS OPKI AD Root CA by a currently cross-certified External Entity CA (other than the FPKI) under a currently valid MOA.

An official designated in the MOA for an External Entity CA currently cross-certified by the DOS OPKI AD Root CA may request cross-certification of a new public key for the re-keyed External Entity CA.

The DOS PKI OA may request the re-key of a DOS OPKI Subordinate CA resulting in a new subordinate CA certificate for the new public key issued by the DOS OPKI AD Root CA.

For a Delegated OCSP Responder with a currently valid certificate, the DOS PKI OA may request re-key of the OCSP Responder's certificate by the issuing DOS OPKI CA.

Subscribers who are the Subject of a currently valid certificate and PKI Sponsors of a currently valid certificate may request re-key of the certificate by the issuing CA. Additionally, a DOS Subordinate CA and its RAs may initiate re-key of a Subscriber's or Sponsor's certificate without a corresponding request.

**4.7.3 Processing Certificate Re-keying Requests**

Before performing re-key, the CMA **must** identify and authenticate the requestor by performing the identification processes defined in Section 3.2 or Section 3.3.

Digitally signed re-key requests **must** be validated before the re-key requests are processed.

The CMA **must** confirm the circumstances requiring re-key of end-entity certificates prior to issuing a new certificate and **must** ensure that the validity period of the re-keyed certificate meets the applicable requirements.

Before the DOS OPKI AD Root CA issues a new cross-certificate, to a cross-certified External Entity CA that has been re-keyed, the CMA **must** verify that it is in accordance with:

- The current MOA between the DOS OPKI and the external CA
- The external CA is currently in compliance with the MOA
- The validity period associated with the new cross-certificate does not extend beyond the period of the MOA
- Issuance is authorized by the DOS PKI PMA, and

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- The request complies with the requirements of Section 4.7.2

**4.7.4 Notification of New Certificate Issuance to Subscriber**

The DOS Subordinate CAs **must** notify affected Subscribers of certificate re-key by any appropriate and secure means equivalent to the assurance level of the certificate issued (e.g., via an automated system notice, a digitally signed email (directly or via the LRA), secure telephone).

**4.7.5 Conduct Constituting Acceptance of a Re-keyed Certificate**

The Subscriber's or PKI Sponsor's failure to object to the certificate or its contents **shall** constitute acceptance of the new certificate.

Subscribers and Sponsors with objections to the certificate **must** communicate in-person or by other secure verifiable means with the supporting RA/LRA. RAs/LRAs will allow sufficient time for the PKI Sponsor to review and respond, depending on the means and timeframe of delivery, but in no case more than seven calendar days.

**4.7.6 Publication of the Re-keyed Certificate by the CA**

As specified in Section 2.2.1 and 4.4.2, the DOS OPKI CAs publish CA and Subscriber certificates in the appropriate certificate repositories.

**4.7.7 Notification of Certificate Issuance by the CA to other Entities**

If the DOS OPKI AD Root CA issues a new self-signed certificate, two weeks prior to issuance the DOS PKI PMA **must** notify the FPKIPA and FPKIMA, other External Entity PKIs cross-certified with the DOS AD Root CA, and CMAs for DOS CAs subordinated to the DOS AD Root CA.

If a Subordinate DOS OPKI CA is re-keyed, two weeks prior to issuance the DOS PKI OA **must** notify the DOS PKI PMA, the FPKIPA and FPKIMA, other External Entity PKIs cross-certified with the DOS OPKI AD Root CA, and CMAs for other DOS OPKI CAs subordinated to the DOS OPKI AD Root CA.

**4.8 CERTIFICATE MODIFICATION**

Modifying (or updating) a certificate means creating a new certificate that has the same or a different key and a different serial number, and that differs in one or more other fields from the old certificate.

Once modified, the old certificate may or may not be revoked, but **must not** be reused for requesting further renewals, re-keys, or modifications.

**4.8.1 Circumstance for Certificate Modification**

CA certificates and Delegated OCSP responder certificates whose characteristics have changed (e.g., assert new policy OID) may be modified.

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A certificate associated with a Subscriber whose characteristics have changed (e.g., name change due to marriage) may be modified.

The DOS OPKI AD Root CA **must** modify the certificates it issued if a Trusted Role, Subordinate CA or cross-certified External Entity CA changes its name. The DOS OPKI AD Root CA **must not** create a new certificate containing a public key that exists in another certificate.

DOS OPKI Subordinate CAs **must** modify the certificates they issued if the subject changes the name or other identifying data included in the certificate (e.g. assert new policy OID). The new certificate may have the same or a different subject public key.

**4.8.2 Who May Request Certificate Modification**

The DOS PKI PMA may request the modification of the DOS OPKI AD Root CA self-signed certificate.

The DOS PKI PMA may request modification of the current cross-certificate issued to the DOS OPKI AD Root CA by the FPKIPA under a currently valid MOA for the following reasons:

- Modification of SIA extension; or
- Minor name changes (e.g., change CA1 to CA2) as part of key rollover procedures.

The DOS PKI PMA may request modification of the current cross-certificate issued to the DOS OPKI AD Root CA by a currently cross-certified External Entity CA (other than the FPKI) under a currently valid MOA for the following reasons:

- Modification of SIA extension; or
- Minor name changes (e.g., change CA1 to CA2) as part of key rollover procedures.

An official designated in the MOA for an External Entity CA currently cross-certified by the DOS OPKI AD Root CA may request cross-certification of a new public key for the re-keyed External Entity CA for the following reasons:

- Modification of SIA extension; or
- Minor name changes (e.g., change CA1 to CA2) as part of key rollover procedures.

The DOS PKI OA may request modification of the current certificate issued to a DOS OPKI Subordinate CA by the DOS OPKI AD Root CA for the following reasons:

- Modification of SIA extension; or
- Minor name changes (e.g., change CA1 to CA2) as part of key rollover procedures.

For a Delegated OCSP Responder with a currently valid certificate, the DOS PKI OA may request modification of the OCSP Responder's certificate by the issuing DOS OPKI CA.

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Subscribers who are the Subject of a currently valid certificate and PKI Sponsors of a currently valid certificate may request modification of the certificate. CAs and RAs may request certificate modification on behalf of a Subscriber.

**4.8.3 Processing Certificate Modification Requests**

A modified certificate may use the same or a different subject public key as the original certificate, depending on issuance constraints. However, if the same key is used, certificate operational periods and key lifetimes as defined in Section 6.3.2 continue to apply.

Before performing certificate modification, the CMA **must** identify and authenticate the requestor by performing the identification processes defined in Section 3.2 or Section 3.3.

Proof of all subject information changes **must** be provided to the CMA and verified before the modified certificate is issued. If the modified certificate is issued with a new (different) public key, the additional requirements specified in Section 4.7.3 **must** also apply.

Digitally signed certificate modification requests **must** be validated before the requests are processed.

If an individual's authorizations or privileges change, such that the modified certificate indicates a reduction in privileges and authorizations, the old certificate **must** be revoked.

Before the DOS OPKI AD Root CA issues a modified cross-certificate to a cross-certified External Entity CA, the CMA **must** verify that:

- The request is in accordance with the current MOA between the DOS OPKI and the External Entity CA
- The External Entity CA is currently in compliance with the MOA
- The validity period associated with the modified cross-certificate does not extend beyond the period of the MOA
- Issuance is authorized by the DOS PKI PMA, and
- The request complies with the requirements of Section 4.8.2.

Except at Rudimentary assurance, if a Subscriber's common name is legally changed (e.g., due to marriage or divorce), then legal proof of the name change (i.e., the same requirements used to apply for a certificate) **must** be provided to the Designated Naming Authority to initiate the name change process in the directory structure. Once this change has taken place, the individual **must** appear before (or be validated by) an RA/LRA in order for an updated certificate having the new name to be issued.

**4.8.4 Notification of New Certificate Issuance to Subscriber**

The DOS Subordinate CAs **must** notify affected Subscribers of certificate modification by any appropriate and secure means equivalent to the assurance level of the certificate issued (e.g., via an automated system notice, a digitally signed email (directly or via the LRA), secure telephone).

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The Subscriber's or PKI Sponsor's failure to object to the certificate or its contents **shall** constitute acceptance of the new certificate.

Subscribers and Sponsors with objections to the certificate **must** communicate in-person or by other secure verifiable means with the supporting RA/LRA. RAs/LRAs will allow sufficient time for the PKI Sponsor to review and respond, depending on the means and timeframe of delivery, but in no case more than seven calendar days.

**4.8.6 Publication of the Modified Certificate by the CA**

As specified in Section 2.2.1 and 4.4.2, the DOS OPKI CAs publish CA and Subscriber certificates in the appropriate certificate repositories.

**4.8.7 Notification of Certificate Issuance by the CA to Other Entities**

Two weeks prior to the DOS OPKI AD Root CA issuing a new self-signed certificate, the DOS PKI PMA **must** notify:

- The FPKIPA and FPKIMA
- Other External Entity PKIs cross-certified with the DOS AD Root CA, and
- The CMAs for DOS CAs subordinated to the DOS AD Root CA.

Two weeks prior to issuing a modified Subordinate DOS OPKI CA certificate, the DOS PKI OA **must** notify:

- The DOS PKI PMA
- The FPKIPA and FPKIMA
- Other External Entity PKIs cross-certified with the DOS AD Root CA, and
- The CMAs for other DOS CAs subordinated to the DOS AD Root CA

**4.9 CERTIFICATE REVOCATION AND SUSPENSION**

For the DOS OPKI AD Root CA, DOS Subordinate CAs, and cross-certified Entity CAs, certificates **must** be revoked when the binding between the subject and the subject's public key defined within a certificate, excluding DN changes, is no longer considered valid. All revocation requests are authenticated as described in Section 5.7.

Revocation requests **must** be authenticated. PIV revocation requests are generally made in person since the request involves surrender or loss of the PIV Card; but written (email, cable, or memo) and telephonic requests may be accepted in the case of known or suspected key compromise, if call-back to a known individual and number (e.g., LRA or RSO) confirms the request. The RA or other Trusted Role may authenticate requests to revoke a certificate using that certificate's associated private key, regardless of whether or not the private key has been compromised.

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For High, Medium Hardware, Medium, and Basic assurance, all CAs **must** publish CRLs as appropriate. OSCP responder certificates that include the *id-pkix-ocsp-nocheck* extension are not required to be listed in the CRLs when revoked.

The DOS PKI PMA **must** notify the FPKIPA and other entities cross-certified with the DOS OPKI AD Root CA, at least two weeks prior to the revocation of a CA certificate, whenever possible. For emergency revocation of CA certificates, the notification procedures in Section 5.7 are followed.

**4.9.1 Circumstances for Revocation**

The CMA **must** revoke certificates issued by the DOS OPKI AD Root CA under three circumstances:

- The first is when the DOS PKI PMA requests revocation of a DOS OPKI AD Root CA-issued certificate. This will be the normal mechanism for revocation in cases where the DOS PKI PMA determines that a subordinate DOS OPKI CA or a cross-certified Entity PKI does not meet the DOS OPKI CP requirements or certification of the Entity PKI is no longer in the best interests of the Department of State or the Federal Government.
- The second is when the DOS PKI PMA receives an authenticated request from a previously designated official of the cross-certified Entity responsible for the CA.
- The third is when the DOS PKIPO determines that an emergency has occurred that may affect the integrity of the certificates issued by a DOS OPKI CA. Under such circumstances, the following individuals may authorize immediate certificate revocation:
  - DOS PKI PMA
  - DOS PKI OA

The DOS PKI PMA **must** review the emergency revocation as soon as practicable.

The DOS OPKI AD Root CA **must**, at a minimum, revoke certificates for the reason of key compromise upon receipt of an authenticated request from a subordinate DOS OPKI CA or cross-certified Entity.

Whenever any of the three circumstances occur, the DOS OPKI AD Root CA **must** revoke the associated certificate and place the revoked certificate on the appropriate revocation list. Revoked certificates **must** be included on all new publications of the certificate status information until the certificates expire.

The CMA **must** revoke the DOS OPKI AD Root CA certificate, a subordinate DOS OPKI CA's certificate, or an External Entity CA's cross-certificate, when the binding between the subject and the subject's public key defined within a certificate, excluding DN changes, is no longer considered valid.

The CMA **must** revoke a Subscriber certificate when the binding between the subject and the subject's public key defined within a certificate is no longer valid. Examples of circumstances that invalidate the binding are:

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- Identifying information or affiliation components of any names in the certificate that become invalid, (i.e., when the Subscriber is no longer affiliated with DOS),
- The Subscriber can be shown to have violated the stipulations of its Subscriber obligations and/or agreement
- The private key is suspected of compromise
- The user or other authorized party (as defined in the CPS) makes a formal request to the CMA asking to revoke his or her certificate
- Privileged attributes if implemented, asserted in the Subscriber's certificate are reduced
- The failure of a CA to adequately adhere to the requirements of this CP or the approved CPS. (e.g., there is strong evidence that the CA has failed to comply with the requirements of Section 6.7 of the CP
- Evidence that a wild card certificate has been issued with a name where the PKI Sponsor does not exercise control of the entire name space associated with the wildcard certificate.
- The CA is made aware that a wildcard certificate has been used to authenticate a fraudulently misleading subordinate Fully-Qualified Domain Name

Whenever any of the above circumstances are reported, the appropriate authority **must** review the circumstances and make a revocation decision. The revocation decision **must** be made based on appropriate criteria, to include:

- The nature of the alleged problem,
- The number of Certificate Problem Reports received about a particular Certificate or Subscriber, and
- Relevant legislation

If it is determined that revocation is required, the associated certificate **must** be revoked (similar to access revocation in 12 FAM 621.3-3) and placed on the CRL. Revoked certificates **must** be included on all new publications of the certificate status information, at least until the certificates expire.

**4.9.2 Who Can Request Revocation**

The DOS PKI PMA may direct revocation of a DOS OPKI AD Root CA certificate, or certificate issued by the AD Root CA. Subordinate DOS OPKI CAs and cross-certified Entity CAs **must** accept, at a minimum, revocation requests from Subscribers. The CMA may support requests for certificate revocation from other parties as specified in the appropriate CPS. A cross-certified Entity Principal CA may always revoke the certificate it has issued to a DOS OPKI AD Root CA without DOS PKI PMA action.

Within the DOS OPKI, a CA may summarily revoke certificates within its domain. An RA may request the revocation of a Subscriber's certificate on behalf of any authorized party as specified in its CPS or Subscriber agreements. A Subscriber can request the revocation of his or her own

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certificate(s). The PKI Sponsor can request revocation of the device, group or role-based certificate for which he or she is responsible.

The DOS OPKI **must** provide Subscribers, Relying Parties, Application Software Suppliers, and other third parties with instructions for reporting suspected Private Key Compromise, Certificate misuse, or other types of fraud, compromise, misuse, inappropriate conduct, or any other matter related to certificates issued by the DOS OPKI. These instructions **must** be posted on the following publicly available web site <https://pkaps.pki.state.gov/docs/Statement.html>.

**4.9.3 Procedure for Revocation Request**

Upon receipt of a revocation request involving a DOS OPKI AD Root CA-issued certificate, the DOS PKI PMA **must** authenticate the request. The DOS PKI PMA may take whatever measures it deems appropriate to verify the need for revocation. If the revocation request appears valid, the DOS PKI PMA **must** direct the DOS PKI OA to revoke the certificate. The DOS PKI PMA **must** give prompt oral or electronic notification to previously designated officials in all subordinate DOS OPKI CAs and cross-certified external Entities having a Principal CA with which the DOS OPKI AD Root CA interoperates. The DOS PKI PMA **must** notify the FPKIPA if a revocation is due to a certificate or system compromise, or a cross-certified Entity CA violation of their Memorandum of Agreement with the DOS OPKI.

Subordinate DOS OPKI CAs and cross-certified External Entity CAs **must** revoke certificates upon receipt of sufficient evidence of compromise or loss of the Subscriber's corresponding private key.

A request to revoke a certificate **must** identify the certificate to be revoked; explain the reason for revocation; and provide a means for the request to be authenticated (e.g., digitally, or manually signed). Where Subscribers use hardware tokens, revocation is optional if all the following conditions are met:

- The revocation request was not for key compromise
- The cryptographic module does not permit the Subscriber to export the signature private key
- The Subscriber surrendered the token to the PKI CMA
- The token was zeroized or destroyed promptly upon surrender
- The token has been protected from malicious use between surrender and zeroization or destruction

In all other cases, revocation of the certificates is **mandatory**. Even where all the above conditions have been met, revocation of the associated certificates is recommended.

Upon receipt of a revocation request from the Subscriber or another authorized party, the CMA **must** authenticate the revocation request. At its discretion, the CA may take reasonable measures to verify the need for revocation. Revocation takes effect upon publication of status information.

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For PKI implementations using hardware tokens, Subscribers leaving organizations that sponsored their participation in the PKI **must** surrender to their CMA (through any accountable mechanism) all cryptographic hardware tokens issued under the sponsoring organization before leaving the organization. If the CA cannot obtain the hardware tokens when a Subscriber leaves an organization, then the CA, immediately upon notification, **must** revoke all Subscribers' certificates associated with the un-retrieved tokens with key compromise specified as the reason. If later recovered, the token **must** be zeroized or destroyed promptly upon surrender and **must** be protected from malicious use between surrender and being zeroized or destroyed. If an organization terminates its relationship with the AD HACA such that it no longer provides affiliation information, the AD HACA **must** revoke all certificates affiliated with that organization.

If it is determined that a private key used to authorize the issuance of one or more certificates may have been compromised, all certificates directly or indirectly authorized by that private key since the date of actual or suspected compromise **must** be revoked or **must** be verified as appropriately issued.

**4.9.4 Revocation Request Grace Period**

The revocation request grace period is the time available to the Subscriber or PKI Sponsor within which they **must** make a revocation request after reasons for revocation have been identified.

There is no grace period for revocation under this policy; the Subscribers, PKI Sponsors and authorized parties **must** notify the CMA as soon as they identify the need to revoke a certificate. CAs will revoke certificates as quickly as practical upon receipt of a proper authenticated revocation request and **must** always revoke certificates within the time constraints described in Section 4.9.5. Also see Section 9.6.3.

**4.9.5 Time Within Which CA Must Process the Revocation Request**

CAs **must** revoke Subscriber certificates as quickly as practicable upon receipt of a proper authenticated revocation request. Revocation requests **must** be processed before the next CRL is published as specified in Section 4.9.7, excepting those requests validated within two hours of CRL issuance. Revocation requests validated within two hours of CRL issuance **must** be processed before the following CRL is published. A request is considered received when a trusted role authorized to revoke certificates, first accesses a valid request.

Routine CA certificate revocation **must** be completed within an agreed time following receipt of an authenticated revocation request. If the revocation is due to a compromise or emergency, the time to revoke **must** adhere to the requirements of Section 4.9.12.

**4.9.6 Revocation Checking Requirements for Relying Parties**

Relying parties are expected to verify the validity of certificates as specified in [RFC 5280].

Use of revoked certificates could have damaging or catastrophic consequences. The Relying Party and/or System Accreditor make any determinations on the matter of how often new

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revocation data should be obtained, considering the risk, responsibility, and consequences for using a certificate whose revocation status cannot be guaranteed.

**4.9.7 CRL Issuance Frequency**

The DOS OPKI AD Root CA and all subordinate DOS OPKI CAs **must** issue CRLs as appropriate. For this CP, issuance encompasses both CRL generation and publication. To the extent practical, the CMA **must** check the contents of CRLs before issuance to ensure that all information is correct.

To ensure timeliness of information, every CA **must** periodically issue and post a CRL to a repository, even if there are no changes or updates required. A CA may issue CRLs more frequently than required. DOS OPKI CAs **must** always post an early update to an applicable Revocation List in the event of a revocation due to key compromise. CRL validity periods will typically be longer than the next update, to facilitate caching for offline or remote (e.g., laptop) operation and other purposes. The CA **must** automatically overwrite the previously posted CRL in the repository by the posting of the new CRL.

For each assurance level, the **required** minimum issuance frequencies for routine CRLs are as follows:

**Table 4-1 CRL Issuance Frequency**

| <b>Assurance Level</b> | <b>Maximum Interval for Routine CRL Issuance</b> |                 |
|------------------------|--------------------------------------------------|-----------------|
|                        | <b>Online</b>                                    | <b>Offline*</b> |
| Rudimentary            | No Stipulation                                   | No Stipulation  |
| Basic                  | 18 hours                                         | 35 Days         |
| Medium (all policies)  | 18 hours                                         | 35 Days         |
| High                   | 18 hours                                         | 35 Days         |

\*An offline CA may incorporate locally attached network equipment such as an HSM or storage array. The CA system and any such locally attached network equipment **must** be completely isolated (air-gapped) from all other networks and computing systems.

For the DOS OPKI AD Root CA, the interval between CRLs **must not** exceed 18 hours. In the case of revocation of a subordinate CA certificate, the appropriate DOS OPKI AD Root CA **must** issue an emergency CRL within six hours of notification. Subordinate CAs that issue certificates to subscribers or operate on-line, **must** issue CRLs at least once every 18 hours, and the *nextUpdate* time in the CRL may be no later than 180 hours after issuance time (i.e., the *thisUpdate* time).

CAs may be operated in an offline manner if the CA only issues:

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- CA certificates
- (optionally) CSS certificates
- (optionally) end user certificates solely for the administration of the CA, and
- (optionally) end user certificates that contain the contentSigning EKU.

For an offline CA, the interval between routine CRL issuance **must not** exceed 35 days. An offline CA **must** publish CRL within six hours of notification of compromise or any other reason that may require certificate revocation of a related or cross-certified CA and/or OCSP responder. An offline CA need not publish a CRL if there are no end-entity Subscribers to that CA. CAs **must** publish certificate status information not later than the next scheduled update.

**4.9.8 Maximum Latency for CRLs**

CRLs **must** be published within 4 hours of generation.

For DOS OPKI CAs that operate offline, pre-generated CRLs intended for publication more than 4 hours after generation **must** be protected in the same manner as the CA. All pre-generated CRLs not yet published **must** be securely destroyed whenever the CA revokes any certificate. The CPS **must** describe protections and processes used to generate and protect of any pre-generated CRLs.

Furthermore, each CRL **must** be published no later than the time specified in the nextUpdate field of the previously issued CRL for same scope.

Note: If CRLs are pre-generated, the thisUpdate field will be the date of generation. The nextUpdate value will be beyond the date of planned publication.

**4.9.9 On-line Revocation or Status Checking Availability**

Under this CP the DOS OPKI CAs and Relying Party client applications may optionally support online status checking. Since the Department of State operates in some environments that cannot accommodate online communications, all DOS OPKI CAs **must** be required to support CRLs.

Note: The FCPF CP requires that on-line status checking via OCSP [RFC 2560] **must** be supported for PIV certificates issued by the DOS PIV CA2, PIV CA3 and the derived PIV certificates issued by the DOS DPC CA.

The FBCA CP requires that on-line status checking via OCSP [RFC 2560] **must** be supported for publicly trusted server authentication and code signing certificates. The DOS PIV CA2 and PIV CA3 do not issue publicly trusted server authentication or code signing certificates.

Online certificate status services used to verify certificates asserting Department of State certificate policies **must** perform the following actions:

- Certificates indicated as being valid have a chain of valid certificates (valid as defined by X.509) linking back to the appropriate DOS OPKI AD Root CA

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- Each certificate in the certificate chain used to validate the certificate whose status is being requested is checked for revocation, such that the Relying Party need not check more than one CSA to validate a Subscriber certificate
- The certificate status response makes clear which attributes, other than certificate subject name the CSA authenticates

If a DOS OPKI CA supports on-line revocation/status checking, the latency of certificate status information distributed on-line by CAs, or their delegated status responders **must** meet or exceed the requirements for CRL issuance stated in Section 4.9.7.

Where on-line status checking is supported, status information **must** be updated and available to relying parties within 18 hours of certificate revocation.

For the status of Subscriber Certificates:

The CA **must** update information provided via an Online Certificate Status Protocol at least every 18 hours. OCSP responses from this service **must** have a maximum expiration time of ten days.

For the status of Subordinate CA Certificates:

The CA **must** update information provided via an Online Certificate Status Protocol whenever CRLs are generated and at least within 18 hours after revoking a Subordinate CA Certificate.

The CA **must** operate and maintain its CRL and OCSP capability with resources sufficient to provide a response time of ten seconds or less under normal operating conditions.

The CA **must** maintain an online 24x7 Repository that application software can use to automatically check the current status of all unexpired Certificates issued by the CA.

The CA **must** maintain a continuous 24x7 ability to respond internally to a high-priority certificate problem report, and where appropriate, forward such a complaint to law enforcement authorities, and/or revoke a Certificate that is the subject of such a complaint.

**4.9.10 On-line Revocation Checking Requirements**

On-line revocation status checking is optional for relying parties. For certificates where revocation status online checking is not available, CRLs **must** be used.

Clients using online revocation checking need not obtain or process CRLs, at their own discretion.

**4.9.11 Other Forms of Revocation Advertisements Available**

A DOS OPKI CA may use other methods to publicize the certificates it has revoked. Any alternative method **must** meet the following requirements:

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- The alternative method **must** be described in the CA's appropriate CPS.
- The alternative method **must** provide authentication and integrity services commensurate with the assurance level of the certificate being verified.
- Any alternate forms used to disseminate revocation information **must** be implemented in a manner consistent with the security and latency requirements for the implementation of CRLs and online revocation and status checking in Sections 4.9.5, 4.9.7, 4.9.8, and 4.9.9.

#### 4.9.12 Special Requirements Related To Key Compromise

In the event of a DOS OPKI AD Root CA or cross-certified Entity Principal CA private key compromise or loss, the cross-certificates **must** be revoked and an emergency CRL **must** be published as soon as feasible, and all cross-certified entities notified.

For subordinate DOS OPKI CAs, when a CA certificate is revoked or Subscriber certificate is revoked because of compromise, or suspected compromise, of a private key, an emergency CRL **must** be issued and published as specified in Table 4-2 below:

**Table 4-2 Emergency CRL Issuance Frequency**

| Assurance Level       | Maximum Latency for Emergency CRL Issuance |
|-----------------------|--------------------------------------------|
| Rudimentary           | No stipulation                             |
| Basic                 | 18 hours after notification                |
| Medium (all policies) | 18 hours after notification                |
| High                  | 6 hours after notification                 |

The CRL **must** contain codes identifying the reason for revoking a certificate and/or specific key pair.

#### 4.9.13 Circumstances for Suspension and Restoration

The DOS OPKI AD Root CA **shall not** suspend certificates.

DOS OPKI Subordinate CAs may support certificate suspension and restoration for Subscriber certificates. If suspension and restoration are supported, the DOS OPKI CPS **must** describe under what circumstances and provide details as specified in sections 4.9.14, 4.9.15, and 4.9.16.

Certificate suspension should only be used in circumstances where there is a reasonable possibility that the certificate will need to be restored. Additionally, a certificate **must** be permanently revoked if it meets the circumstances stated in Section 4.9.1.

**UNCLASSIFIED****4.9.14 Who can Request Suspension and Restoration**

The DOS OPKI AD Root CA does not support suspension and restoration of certificates it issues.

For DOS OPKI Subordinate CAs, an RA may request the suspension of a Subscriber's certificate on behalf of any authorized party as specified in the DoS PKI CPS or Subscriber agreements. The PKI Sponsor can request suspension of the device, group or role-based certificate for which he or she is responsible.

For DOS CAs that support suspension and restoration, those personnel authorized to request suspension and restoration of a certificate **must** be identified.

**4.9.15 Procedure for Suspension and Restoration Requests**

The request to suspend or restore a certificate **must** include:

- Authentication of the Requestor,
- Identification of the certificate to be suspended or restored, and
- Explanation of the reason for suspension or restoration

The DOS AD Root CA does not support suspension or restoration of certificates it issues.

DOS Subordinate CAs **must** suspend or restore certificates upon receipt of an authenticated request that meets the requirements stipulated in this CP and the DoS PKI CPS. A request to suspend or restore a certificate **must** identify the certificate to be suspended or restored and provide a means for the request to be authenticated (e.g., digitally signed).

Upon receipt of a certificate suspension or restoration request, the CA **must** authenticate the request. Suspension or restoration takes effect upon publication of status information.

For DOS OPKI CAs that support suspension and restoration, all suspended certificate serial numbers **must** be populated on a full CRL within a timeframe specified in Section 4.9.7. The reason code CRL entry extension **must** be populated with "certificateHold". Restored certificate serial numbers **must not** be present on the next full CRL published by the CA.

A certificate is considered restored only if its status at the time of CRL generation is neither suspended nor revoked.

If a CA or CMS product conducts certificate suspensions and restorations in an automated fashion (e.g., without a formal request outlined above), the circumstances or parameters associated with those automated suspensions and restorations must be documented in a CPS.

If a subscriber is requesting restoration of their suspended certificate, the identity of the subscriber must be re-established before restoring the certificate. The subscriber's identity may be re-established using processes defined in Section 3.2.3.1, through the use of biometrics on

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file, or by the use of another private signature key of equivalent or greater assurance level issued to the subscriber.

The private key associated with any suspended certificate must not be used to authenticate the identity of the certificate subject.

**4.9.16 Limits on Suspension Period**

The maximum period of time that a certificate may be suspended **must** be specified. The CPS **must** describe in detail how this maximum suspension period is enforced. If the Subscriber has not removed the certificate from hold (suspension) within that period, the certificate **must** be revoked. Certificates **must not** be published on a CRL with a reason code of “certificateHold” beyond the expiration date of the certificate.

To mitigate the threat of an unauthorized person removing the certificate from hold, the identity of the RA or authorized individual removing the suspension should be authenticated using a mechanism equivalent or higher than the assurance level of the certificate being unsuspended.

**4.10 CERTIFICATE STATUS SERVICES**

CSSs are not a required component of the DOS OPKI under this CP. If supported, the CSS is considered an integral part of the CA system.

**4.10.1 Operational Characteristics**

A CSS **must** meet the following requirements:

- The CSS **must** be operated in compliance with this CP
- Information exchanged between the CA and the CSS **must** be authenticated and protected from modification using mechanisms commensurate with the requirements of the data to be protected by the certificates being issued
- Accurate and up-to-date information from the associated CA **must** be used to provide the revocation status
- Revocation status responses **must** provide authentication and integrity services commensurate with the requirements of the data to be protected by the certificates being issued, to include the status of the certificate and the time the status indication was generated
- Latency of certificate status information **must** meet or exceed the requirements for CRL issuance stated in Section 4.9.7

**4.10.2 Service Availability**

Where applicable this **must** be described in the CPS.

**UNCLASSIFIED****4.10.3 Optional Features**

Where applicable this **must** be described in the CPS.

**4.11 END OF SUBSCRIPTION**

This CP makes no stipulation.

**4.12 KEY ESCROW AND RECOVERY**

The DOS OPKI AD Root CA **must not** perform any encryption key recovery functions involving subordinate DOS OPKI CAs or cross-certified Entity CAs. The DOS OPKI AD Root CA **must not** store any information encrypted by subordinate DOS OPKI CA's public keys that may require key recovery capabilities. However, when encryption key pairs need to be issued by the DOS OPKI AD Root CA to cover repository system access or for other purposes, the DOS PKI PMA **must** publish applicable requirements for that purpose.

**4.12.1 Key Escrow and Recovery Policy and Practices**

DOS OPKI Key Recovery Policy is documented in this CP.

DOS OPKI Key Recovery practices **must** be documented in the DOS PKI CPS.

The Key Recovery practices **must** satisfy privacy and security requirements for the CAs issuing and managing digital certificates under this DOS OPKI CP.

DOS OPKI CA private keys are **never** escrowed.

**Under no circumstances** will a Subscriber's signature key be escrowed, or any third party hold in trust a Subscriber's private signature key.

Under this CP Subscriber key management keys may be escrowed to provide key recovery.

Subordinate DOS OPKI CAs may escrow Subscriber key management keys to provide for recovery of those keys. The CA **must** protect escrowed keys at no less than the level of security in which they are generated, delivered, and protected by the Subscriber.

Escrowed keys **must** be maintained within an online KED for a minimum of one year after the expiration of the associated public key certificate.

When considering allowing recovery of *id-fpki-certpcy-mediumHardware* key management keys to software, careful consideration should be given to the risk of unauthorized decryption of data encrypted by the recovered keys. The DOS OPKI CPS **shall** define those scenarios in which this risk is acceptable (see Section 6.2.1 for further details).

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**4.12.1.1 Key Escrow Process and Responsibilities**

Human subscriber private keys (i.e., decryption private keys) associated with a key management certificate **must** be securely escrowed by the KED. The DOS OPKI CA **must** ensure that the keys are escrowed successfully prior to issuing the key management certificates.

Subscriber private keys **must** be protected during transit and storage using cryptography at least as strong as the key being escrowed.

Subscribers **must** be notified that the private keys associated with their encryption certificates will be escrowed.

**4.12.1.2 Key Recovery Process and Responsibilities**

Communications between the various key recovery participants (KED, DDS, KRA, KRO, Requestor, and Subscriber) **must** be secured from protocol threats such as disclosure, modification, replay, and substitution. The strength of all cryptographic protocols **must** be equal to or greater than that of the keys they protect.

During delivery, escrowed keys **must** be protected against disclosure to any party except the Requestor.

When any mechanism that includes a shared secret (e.g., a password) is used to protect the key in transit, the mechanism **must** ensure that the Requestor and the transmitting party are the only holders of this shared secret.

Subscribers may use electronic or manual means to request their own escrowed keys from the key recovery service. The Subscriber may submit the request to the KRA or KRO. If the request is made electronically, the subscriber **must** digitally sign the request or authenticate to a recovery service using an associated authentication or signature certificate with an assurance level equal to or greater than that of the escrowed key. Manual requests **must** be made in person and include proper identity verification by the KRA in accordance with Section 3.2.3.1.

Third-Party Requestors may use electronic or manual means to request a Subscriber's escrowed keys. The Requestor **must** submit the request to the KRA or KRO. If the request is made electronically, the Requestor **must** digitally sign the request using an authentication or signature certificate, trusted by the DOS, with an assurance level equal to or greater than that of the escrowed key. Manual requests **must** include proper identity verification by the KRA in accordance with Section 3.2.3.1.

Third Party key recovery in and of itself does not require revocation of a Subscriber certificate. This does not prohibit Subscribers from requesting revocation of their own certificates for any reason.

**4.12.1.2.1 Key Recovery Through KRA**

The KRA **must** provide access to a copy of an escrowed key only in response to a properly authenticated and authorized key recovery request. Such access requires the actions of at least

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two KRAs. All copies of escrowed keys **must** be protected using two-person control procedures during recovery and delivery to the authenticated and authorized third-party Requestor. Split key or password procedures are considered adequate two-person controls, provided they comply with technical controls in Section 6.2.2.

Note: A combination of physical, procedural, and technical security controls can be used to enforce continuous two-person control during recovery and delivery of escrowed keys. The KRS should be designed to maximize the ability to enforce two-person control technically.

The KRA is not required to notify subscribers of a third-party key recovery.

Note: Subscriber notification of key management key recovery is not necessary and may be prohibited in certain use cases (e.g., Counterintelligence or Law Enforcement investigations).

**4.12.1.2.2 Automated Self-Recovery**

A current Subscriber's escrowed keys may be provided directly to the Subscriber without imposition of two-person control requirements. The KED **must only** provide escrowed keys to current Subscribers without two-person control upon:

- Verifying that the authenticated identity of the Requestor is the same as the Subscriber associated with the escrowed keys being requested
- Sending notification to the Subscriber of all attempts (successful or unsuccessful) to recover the Subscriber's escrowed keys that are made by entities claiming to be the Subscriber. If the KED does not have information (e.g., an e-mail address) necessary to send notification to the Subscriber of a key recovery request, then the KED **must not** provide the Subscriber with the requested key material using the automated recovery process. Where possible, the e-mail address will be from the subject alternative name field of the certificate being recovered.
- Ensuring that the escrowed keys are being sent only to the authenticated Subscriber associated with the escrowed keys
- Ensuring that the escrowed keys are encrypted during transmission using cryptography of equal or greater strength than provided by the escrowed keys.

**4.12.1.2.3 Key Recovery During Token Issuance**

When a Subscriber (individual and/or group/role sponsor or member) is issued a new certificate on a hardware token, private key management keys for the Subscriber may be recovered as part of the issuance process as long as the KED uses secure means, such as Global Platform Secure Channel Protocol, to inject the key history onto the hardware token directly.

The hardware token **must** meet FIPS 140 Level 2 hardware requirements, and the key **must** be injected into the token such that it is not thereafter exportable.

**4.12.1.2.4 Key Recovery by Data Decryption Server****UNCLASSIFIED**

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The DOS OPKI has not implemented a Data Decryption Server.

***4.12.1.3 Who Can Submit a Key Recovery Application***

Subscribers may request recovery of their own escrowed keys.

Key recovery may be requested by an internal Third-Party Requestor in accordance with the key recovery practices specified in the DOS OPKI CPS.

Key recovery may also be requested and by authorized external Third-Party Requestors (e.g., law enforcement personnel with a court order from a competent court) in accordance with the key recovery practices specified in the DOS OPKI CPS.

***4.12.1.3.1 Requestor Authorization Validation***

The KRA or the KRO, as an intermediary for the KRA, **must** validate the authorization of the Requestor in accordance with the key recovery practices specified in the DOS OPKI CPS.

The DOS OPKI CPS **must** specify internal notification requirements for External Third-Party key recovery requests and account for situations where the law requires the KED to release the Subscriber's private key without organizational notification.

Nothing in this document is intended to change the current procedures for obtaining information about individuals in connection with such requests.

***4.12.1.3.2 Subscriber Authorization Validation***

Current Subscribers are **authorized** to recover their own escrowed key material.

***4.12.1.3.3 KRA Authorization Validation***

The KED **must** verify that the KRA has appropriate privileges to obtain the keys for the identified Subscriber's organization.

***4.12.1.3.4 KRO Authorization Validation***

The KED or KRA **must** verify that the KRO is authorized to request keys for the identified Subscriber.

***4.12.1.3.5 Data Decryption Server Authorization Validation***

The DOS OPKI has not implemented a Data Decryption Server.

***4.12.2 Session Key Encapsulation and Recovery Policy and Practices***

The DOS OPKI does not support session key encapsulation and recovery.

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## 5. FACILITY MANAGEMENT AND OPERATIONS CONTROLS

### 5.1 PHYSICAL CONTROLS

All DOS OPKI CA equipment, including CA cryptographic modules, **must** be protected from unauthorized access at all times. The CA **must** implement physical access controls to reduce the risk of equipment tampering even when the cryptographic module is not installed and activated. CA cryptographic tokens **must** be protected against theft, loss, and unauthorized use.

All the physical control requirements apply equally to all DOS OPKI CAs, and any remote workstations used to administer the CAs except where specifically noted.

#### 5.1.1 Site Location and Construction

The location and construction of the facility housing DOS OPKI CA equipment, as well as sites housing remote workstations used to administer the CAs, **must** be consistent with facilities used to house high value, sensitive information. The site location and construction, when combined with other physical security protection mechanisms such as guards, high security locks and intrusion sensors, **must** provide robust protection against unauthorized access to CA equipment and records.

The location and construction of any facility housing CMA equipment and operations **must** be in accordance with the Department of State Foreign Affairs Manual, Chapter 12, Section 623.11 (12 FAM 623.11), *Physical and Environmental Protection Policy* and Foreign Affairs Handbook Volume 12, Handbook 10, Section H-272.17 (12 FAH-10 H-272.17), *Physical and Environmental Protection*.

#### 5.1.2 Physical Access

##### 5.1.2.1 *Physical Access for CA Equipment and Remote CA Administration Workstations*

##### 5.1.2.1.1 *Physical Access for CA Equipment*

The CMA staff and DOS PKI facilities **must** protect DOS OPKI CA equipment from unauthorized access at all times. The security mechanisms **must** be commensurate with the level of threat in the equipment environment. Since the DOS OPKI AD Root CA and subordinate CAs **must** plan to issue certificates at all levels of assurance, the DOS PKI OA **must** operate and control all CAs on the presumption that each **must** issue at least one High Assurance or Medium Hardware Assurance certificate.

The physical security requirements pertaining to DOS OPKI CAs that issue only Basic Assurance certificates are:

- Ensure no unauthorized access to the hardware is permitted
- Ensure all removable media and paper containing sensitive plain-text information is stored in secure containers.

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In addition to those requirements, the following requirements **must** apply to DOS OPKI CAs that issue Medium, Medium Hardware, or High assurance certificates:

- Ensure manual or electronic monitoring for unauthorized intrusion at all times
- Ensure an access log is maintained and inspected periodically
- Require two-person physical access control to both the cryptographic module and computer system.

Multi-person physical access control to CA equipment can be achieved by any combination of two or more trusted roles (see Section 5.2.2) as long as the tasks being conducted are segregated in accordance with the requirements and duties defined for each trusted role.

The CMAs **must** inactivate removable CA cryptographic modules before storage. Removable cryptographic modules, removable media, activation information used to access or enable cryptographic modules or other sensitive CMA equipment, and paper or other media containing sensitive plain-text information, **must** be placed in secure locked containers when not in use. Such containers **must** be sufficient for housing equipment and information commensurate with the classification, sensitivity, or value of the information protected by the certificates issued by the CA.

Activation data **must** be either memorized, or recorded and stored in a manner commensurate with the security afforded the cryptographic module, and **must not** be stored with the cryptographic module or removable hardware associated with remote workstations used to administer the CA.

A security check of the facility housing DOS OPKI CA equipment or remote workstations used to administer the CAs (operating at the Basic Assurance level or higher) **must** occur before leaving the facility unattended. At a minimum, the check **must** verify the following using Form SF-701 Activity Security Checklist:

- The equipment is in a state appropriate to the current mode of operation (e.g., that cryptographic modules are in place when “open”, and secured when “closed”; and for offline CAs, that all equipment other than the repository is shut down)
- All security containers are properly secured
- Physical security systems (e.g., door locks, vent covers) are functioning properly
- The area is secured against unauthorized access.

The DOS PKI OA **must** explicitly designate a person or group of persons responsible for making such checks. When a group of persons is responsible, a log **must** be maintained that identifies the person performing the check at each instance. If the facility is not continuously attended, the last person to depart **must** initial a sign-out sheet that indicates the date and time and asserts that all necessary physical protection mechanisms are in place and activated.

For CAs operating at the Medium, Medium Hardware, or High assurance level the following requirements **must** also apply:

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- CA equipment is manually or electronically monitored for unauthorized intrusion at all times
- A visitor access log is maintained and periodically inspected.

**5.1.2.1.2 Physical Access for Remote CA Administration Workstations**

Remote CA administration workstations that authenticate directly to the CA using hardware certificates issued at a level of assurance commensurate with that of the CA and communicate via secured protocols are not subject to the physical access controls of the CA but **must** be protected from unauthorized access while the cryptographic module is installed and activated. Remote CA administration workstations **must** implement physical access controls to reduce the risk of equipment tampering even when the cryptographic module is not installed and activated. These security mechanisms **must** be commensurate with the level of threat in the workstation environment.

- CMAs **must only** install Security Management Administration (SMA) software on workstations specifically designated for remote CA administration
- Remote CA administration workstations **must** be equipped with removable hard drives, and these hard drives **must** be protected against theft, loss, and unauthorized use.
- When not in use, the CMAs **must** place removable hard drives, CMA cryptographic modules, removable media, and any activation information used to access or enable CMA cryptographic modules or CMA equipment, or paper containing sensitive plain-text information, in locked containers. Such containers **must** be sufficient for housing equipment and information commensurate with the classification, sensitivity, or value of the information protected by the certificates issued by the CMA.
- CMAs **must** implement physical access controls on remote CA administration workstations as appropriate to reduce the risk of equipment tampering even when the cryptographic module and hard drive are not installed and activated
- CMA cryptographic tokens **must** be protected against theft, loss, and unauthorized use
- CMAs **must** implement access controls and communication mechanisms on all remote CA administration workstations to include identification of both the CMA staff and workstation identification by the firewall and/or CA

**5.1.2.2 Physical Access for RA Equipment**

RA equipment **must** be protected from unauthorized access while the RA's cryptographic module is installed and activated. RAs **must** implement physical access controls on RA equipment as appropriate to reduce the risk of equipment tampering even when the cryptographic module is not installed and activated. RA cryptographic tokens **must** be protected against theft, loss, and unauthorized use. These security mechanisms **must** be commensurate with the level of threat in the RA equipment environment.

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**UNCLASSIFIED****5.1.2.3 Physical Access for CSS Equipment**

Physical access control requirements for CSS equipment that has signing capability **must** meet the CA physical access requirements specified in Section 5.1.2.1.1. CSS equipment that does not have a private signing key and only distribute pre-generated OCSP responses are not required to meet these requirements.

**5.1.2.4 Physical Access for CMS Equipment**

Physical access control requirements for CMS equipment **must** meet the DOS OPKI CA physical access requirements specified in Section 5.1.2.1.1.

**5.1.2.5 Physical Access for KED Equipment**

Physical access control requirements for KED equipment that store private keys **must** meet the CA physical access requirements specified in Section 5.1.2.1.1.

**5.1.2.6 Physical Access for DDS Equipment**

The DOS OPKI has not implemented a Data Decryption Server.

**5.1.2.7 Physical Access for KRA and KRO Equipment**

KRA and KRO equipment **must** be protected from unauthorized access while the cryptographic module is installed and activated. The KRA and KRO **must** implement physical access controls to reduce the risk of equipment tampering even when the cryptographic module is not installed and activated. These security mechanisms **must** be commensurate with the level of threat in the equipment environment.

**5.1.3 Power and Air Conditioning**

The facility housing CA equipment **must** have power and air conditioning sufficient to create a reliable operating environment. DOS OPKI CAs operating at a Basic, Medium, or High assurance level **must** have backup capability sufficient to automatically lockout input, finish any pending actions, and record the state of the equipment before lack of power or air conditioning causes a shutdown. In addition, the DOS OPKI CA directories (containing CA certificates and CRLs) **must** have uninterrupted power sufficient for a minimum of six (6) hours operation in the absence of commercial power, to maintain availability and avoid denial of service.

**5.1.4 Water Exposures**

CA equipment **must** be installed such that it is not in danger of exposure to water and ensure installation of moisture detectors in areas susceptible to flooding. This requirement excludes potential water damage from fire prevention and protection measures (e.g., sprinkler systems). Contingency plans for a CA that has sprinklers for fire control **must** address recovery if the sprinklers malfunction, or cause water damage outside the fire area. This policy makes no stipulation on prevention of exposure of CA equipment to water beyond that called for by 12 FAH 10-272.13-1 policy for DOS Data Centers.

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**UNCLASSIFIED****5.1.5 Fire Prevention and Protection**

This policy makes no stipulation on fire prevention and protection of CA equipment beyond that called for by FAH 10-272.11 policy for DOS Data Centers. A description of the CMA's approach for recovery from a fire disaster **must** be included in the Contingency Plan required by Section 5.7.

**5.1.6 Media Storage**

Sensitive CA media **must** be stored to protect it from accidental damage (water, fire, electromagnetic) and unauthorized physical access. Media that contains security audit, archive or backup information **must** be stored in a location separate from the CA equipment.

**5.1.7 Waste Disposal**

Normal office waste **must** be removed or destroyed in accordance with local policy. Sensitive media and documentation that are no longer needed for operations **must** be destroyed before disposal, such that the information is unrecoverable.

**5.1.8 Off-Site backup**

DOS OPKI CAs operating at Basic, Medium, Medium Hardware, or High assurance levels **must** make system backups sufficient to recover from system failure, on a periodic schedule **specified** in the CPS. The DOS CMAs **must** perform and store full backups of all DOS OPKI CAs off-site from the CA equipment not less than once per week.

The CMAs **must** retain not less than the latest full backup. The backup(s) **must** be stored at a site with physical and procedural controls commensurate to that of the operational CA system.

For offline CAs, the backup **must** be performed each time the system is turned on or once per week, whichever is less frequent.

Requirements for CA private key backup are specified in Section 6.2.4.

**5.2 PROCEDURAL CONTROLS**

Unless stated otherwise, the requirements in this section apply equally to all DOS OPKI CAs.

**5.2.1 Trusted Roles**

A trusted role is one whose incumbent performs functions that can introduce security problems if not carried out properly, whether accidentally or maliciously. The personnel selected to fill these roles **must** be extraordinarily responsible and above reproach or the integrity of the CA is weakened. The functions performed in these roles form the basis of trust in the entire PKI. Two approaches are taken to increase the likelihood that these roles can be successfully carried out. The first approach is to ensure that the person filling the role is trustworthy and properly trained. The second is to distribute the functions of the role among more than one person, so that any malicious activity requires collusion.

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An auditable record **must** be created identifying when personnel are added or removed from a trusted role, as well as who added or removed them from the role. The individual who authorized the role assignment, or any series of role assignments over a given period of time, **must** also be traceable via audit and archive records.

**5.2.1.1 Certification Authority Trusted Roles**

The requirements of this policy are defined in terms of the following four roles. Additional roles may be defined in the applicable CPS provided the following separation of duties are enforced.

- *Administrator* – authorized to install, configure, and maintain the CA and KED; establish and maintain system accounts; configure audit parameters; and generate PKI component keys
- *Officer* – authorized to request approve, or perform certificate issuance, revocations, or key recovery, as appropriate.
- *Auditor* – authorized to review, maintain, and archive audit logs
- *Operator* – authorized to perform system backup and recovery and other routine operations in support of the CA and KED equipment

Administrators **shall not** issue certificates to Subscribers.

These four roles are employed at the CA, CMS, KRS, and CSS locations as appropriate. Separation of duties **must** comply with Section 5.2.4, and requirements for two-person control with Section 5.2.2, regardless of the titles and numbers of Trusted Roles.<sup>7</sup>

The following subsections provide a more detailed description of the responsibilities for each of these roles:

**5.2.1.1.1 Administrator**

The Administrator role is **responsible** for the following:

- Installation, configuration, and maintenance of the CA and KED equipment to include the operating system (OS)
- Establishing and maintaining CA and KED system accounts
- Configuring certificate profiles or templates and audit parameters
- Generating and backing up CA and KED keys

Administrators do not issue certificates to Subscribers.

See Section 5.2.4 for role separation requirements.

**5.2.1.1.2 Officer**

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<sup>7</sup> A person providing trusted role support for one CA may fill the same or different trusted role position for another CA, so long as the provisions of Section 5.2 of this CP and the applicable CPS are met for each individual CA.

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The Officer role is **responsible** for issuing certificates<sup>8</sup>, that is:

- Registering new Subscribers and securely requesting the issuance of certificates
- Verifying the identity of Subscribers, validity of documentation, and accuracy of information included in certificates
- Approving and executing the issuance or recovery of certificates
- Requesting, approving, and executing the revocation of certificates
- Receiving, controlling, and distributing Subscriber certificates on FIPS 140 Level 2 compliant hardware tokens (cryptographic modules containing the Subscriber's private key), as specified in this CP and the applicable DOS CPS

The Officer also performs the administration and operation of the RA workstation.

See Section 5.2.4 for role separation requirements.

**5.2.1.1.3 Auditor**

The Auditor role is **responsible** for the following:

- Reviewing, maintaining, and archiving audit logs
- Performing or overseeing internal compliance audits to ensure that the CA is operating in accordance with its CPS

See Section 5.2.4 for role separation requirements.

**5.2.1.1.4 Operator**

The Operator role is **responsible** for the routine operation of the CA and KED equipment and operations such as system backups and recovery, changing recording media, the access control to and transport of sensitive material under multi-person control, and other support of PKI ancillary components and functions. The Operator typically provides PKI system support for those functions not assigned to the Administrators or Officers.

An Administrator or Officer may also function as an Operator, but in doing so **must not** be both an Administrator and an Officer, as described in Section 5.2.4, or have the permissions for both roles. The Operator role itself **must** have no administrator/super user/root access to the operating system, or certificate management permissions on the CA application, or key recovery permissions on the KED application, but may have "read-only" permissions to support routine operations. An Operator may have these permissions as part of the Administrator or Officer roles but **must** meet role separation requirements in Section 5.2.4.

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<sup>8</sup> The Officer (a.k.a. Security Officer, Registration Authority) may not register, request, or approve issuance or recovery of their own certificates; or verify identity, validity of documentation, or accuracy of information pertaining to their own identity.

**UNCLASSIFIED****5.2.1.2 Registration Authority Trusted Roles**

An RA may be considered an Officer as defined in Section 5.2.1.1 and is **responsible** for:

- verifying initial identity, as described in Section 3.2
- entering Subscriber information, and verifying correctness
- securely communicating requests to and responses from the CA
- receiving and distributing Subscriber certificates.

The RA role is highly dependent on implementation and local requirements. The responsibilities and controls for RAs **must** be explicitly described in the CPS of a CA if the CA uses an RA.

**5.2.2 Number of Persons Required per Task**

Only one person is **required** per task for CAs operating at the Rudimentary and Basic Levels of Assurance.

Medium, Medium Hardware, and High assurance CAs **must** enforce multi-person controls on the CA private signing key and KED key to prevent duplication or theft without collusion.

Two or more persons are **required** for DOS OPKI CAs operating at the Medium, Medium Hardware, or High Levels of Assurance for the following tasks:

- CA or KED key generation
- CA signing key activation
- CA or KED private key backup

Medium, Medium Hardware, and High assurance CAs **must** enforce multi-person controls on the CA private signing key and KED key to prevent duplication or theft without collusion.

Where multiparty control is **required**, at least one of the participants **must** be an Administrator. All participants **must** serve in a trusted role as defined in Section 5.2.1. Multiparty control for logical access **must not** be achieved using personnel that serve in the Auditor Trusted Role.

The participation of two KRAs is **required** for third-party key recovery.

**5.2.3 Identification and Authentication for Each Role**

At all assurance levels other than Rudimentary, an individual **must** identify and authenticate him or herself before being permitted to perform any actions set forth above for that role or identity.

**5.2.4 Roles Requiring Separation of Duties**

**Requirements** for the separation of roles, and limitations on use of procedural mechanisms to implement role separation, are described below for each level of assurance in Table 5-1 below:

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Table 5-1 Role Separation Rules

| Assurance Level            | Role Separation Rules                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rudimentary                | No stipulation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Basic                      | Individual personnel <b>must</b> be specifically designated to the four roles defined in Section 5.2.1 above. Individuals may assume more than one role; however, no one individual <b>shall</b> assume both the Officer and Administrator roles. This may be enforced procedurally. No individual <b>shall</b> be assigned more than one identity.                                                                                                                                                                                                                                         |
| Medium and Medium Hardware | Individual personnel <b>must</b> be specifically designated to the four roles defined in Section 5.2.1 above. Individuals may assume only one of the Officer, Administrator, and Auditor roles, but any individual may assume the Operator role. The CA, CMS, and RA software and hardware <b>must</b> identify and authenticate its users and <b>must</b> ensure that no user identity can assume both an Administrator and an Officer role, assume both the Administrator and Auditor roles, or assume both the Auditor and Officer roles. No individual may have more than one identity. |
| High                       | Individual personnel <b>must</b> be specifically designated to the four roles defined in Section 5.2.1 above. Individuals may assume only one of the Officer, Administrator and Auditor roles. Individuals designated as Officer or Administrator may assume the Operator role. An auditor may not assume any other role. The CA and RA software and hardware <b>must</b> identify and authenticate its users and <b>must</b> enforce these roles. No individual <b>shall</b> have more than one identity.                                                                                  |

A Trusted Role may perform the same role on the CA, and KED.

**Under no circumstances** will a KRA or KRO be an Administrator or Auditor for a KED.

A RA may fill the role of a KRA or KRO. An LRA may fill the role of a KRO.

**Only** the Auditor Trusted Role may perform internal compliance auditor functions.

The DOS OPKI AD Root CA **must** operate at the High Assurance level. For DOS OPKI Subordinate CAs, the applicable CPS designates the operating assurance level.

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**UNCLASSIFIED****5.3 PERSONNEL CONTROLS****5.3.1 Qualifications, Experience, and Security Clearance Requirements**

All persons filling trusted roles **must** be selected based on loyalty, trustworthiness, and integrity. Trusted persons **must** be Department of State direct-hire personnel or contractors. Only U.S. citizens may fill DOS OPKI trusted roles.

Only employees of the DOS PKIPO may fill DOS OPKI trusted roles, unless specifically appointed by the DOS PKI OA to satisfy operational requirements. In addition to having the required knowledge and experience to perform the trusted role functions, personnel appointed to DOS OPKI trusted roles **must** meet the following requirements:

- **Must** be employees of the Department of State, GS-5 (equivalent) or above, or equivalent contractor/vendor position of responsibility
- **Must** be a U.S. citizen
- **Must not** have been previously relieved of related duties for reasons of negligence or non-performance of duties
- **Must not** have been denied a security clearance, or had a security clearance revoked
- **Must not** have been convicted of a felony offense
- **Must** be appointed in writing by the DOS PKI OA
- **Must** hold at a minimum a SECRET security clearance
- **Must** undergo role specific training in accordance with Section 5.5.3
- **Must** complete and sign a PKI Trusted Role Acknowledgement of Responsibilities Form (DOS PKI TRAR Form) before they can be appointed to the Trusted Role.

**5.3.2 Background Check Procedures**

DOS OPKI personnel acting in PKI trusted roles **must**, at a minimum, undergo background check procedures necessary to be cleared at the SECRET level as outlined in 3 FAM 2222. Information obtained from such checks, performed solely to determine the suitability of a person to fill a DOS OPKI role, are not releasable except as required in Section 9.4.

DOS OPKI CA personnel **must** receive a favorable adjudication after undergoing a background investigation covering the following areas:

- Employment,
- Education,
- Place of residence, and
- Law Enforcement.

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The period of initial investigation **must** cover at least the last five years for each area, excepting the residence check, which **must** cover at least the last three years. Regardless of the date of award, the investigation **must** verify the highest educational degree obtained.

Adjudication of the background investigation **must** be performed by a competent adjudication authority using a process consistent with [Executive Order 12968] or equivalent.<sup>9</sup>

For Federal employees and cleared contractors:

- A national security eligibility (i.e., Confidential or above) is granted after positive adjudication of a Tier 3 or Tier 5 investigation,
- A suitability determination is granted after positive adjudication of a Tier 2 or Tier 4 investigation, and
- A PIV credential eligibility is granted after a positive adjudication of a Tier 1 investigation.

An active national security eligibility, suitability determination, or PIV credential eligibility fulfills the background check procedure requirements and continued maintenance of those determinations fulfills any reinvestigation requirements.

In all cases, the reinvestigation period for a Trusted Role background check **must not** exceed 10 years. If a Trusted Role's national security eligibility, suitability determination, or PIV eligibility is ever suspended or revoked during their appointment, all CA accesses **must** be revoked until the security eligibility, suitability determination, or PIV eligibility is reinstated or a separate investigation is completed and adjudicated.

Note: For Federal organizations, continuous evaluation (CE) processes, where utilized, replace the need for periodic reinvestigations. Currently CE is in use for national security eligibility recipients and are planned for inclusion of the other determination types.

### **5.3.3 Training Requirements**

All personnel performing duties with respect to the operation of a DOS OPKI CA or RA **must** receive comprehensive training.

Training **must** be conducted in the following areas:

- CA (or RA) security principles and mechanisms,
- Key Recovery System security principles and mechanisms,
- All PKI software versions in use on the CA (or RA) system,
- All PKI duties they are expected to perform,
- Disaster recovery and business continuity procedures, and

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<sup>9</sup> A successfully adjudicated National Agency Check with Written Inquires (NACI) or National Agency Check with Law Enforcement Check (NACLIC) on record is deemed to have met the minimum standards specified above.

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- Stipulations of the applicable CP and CPS.

Documentation **must** be maintained identifying all personnel who received training, and the level of training completed.

**5.3.4 Retraining Frequency and Requirements**

Individuals responsible for PKI trusted roles **must** be aware of changes in the operation of the DOS OPKI CAs and related systems. Any significant change to the operations **must** have a training (awareness) plan, and the execution of such plan **must** be documented. Examples of such changes are CA software or hardware upgrade, changes in automated security systems, and relocation of equipment.

Documentation **must** be maintained identifying all personnel who received training and the level of training completed.

**5.3.5 Job Rotation Frequency and Sequence**

This policy makes no stipulation regarding frequency or sequence of job rotation. Local policies that do impose such requirements **must** provide for continuity and integrity of the PKI service. Job rotation **must not** violate role separation. All access rights associated with a previous role **must** be terminated.

All job rotations **must** be documented. Individuals assuming an auditor trusted role **must not** audit their own work from a previous role.

**5.3.6 Sanctions for Unauthorized Actions**

The DOS PKI OA **must** take appropriate administrative and disciplinary actions against personnel who have performed actions involving the DOS OPKI CAs, RAs, KRSs, CSSs, or repositories not authorized in this CP, the applicable CPS, or other documented procedures approved by the DOS PKI OA.

A CMA **must** report suspected security violations or compromises to Diplomatic Security and the DOS PKI OA so that the proper authorities may take appropriate administrative and/or disciplinary actions against personnel who violate the applicable provisions of 12 FAM 590.

**5.3.7 Independent Contractor Requirements**

Contractor personnel employed to operate any part of the DOS OPKI or perform functions pertaining to the Department's PKI infrastructure **must** be subject to the same requirements as U.S. Government employees performing those functions. Contractor personnel filling trusted roles **must** be cleared at a minimum to the SECRET level in accordance with 12 FAM 570 and 3 FAM 2222.

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**UNCLASSIFIED****5.3.8 Documentation Supplied to Personnel**

The DOS PKIPO **must** provide documentation to each person assigned to a DOS OPKI Trusted Role to provide the information they need to perform the functions of that role, including relevant policies and practices, roles and responsibilities, operating procedures, architecture and system information, and security and contingency plans.

**5.4 AUDIT LOGGING PROCEDURES**

The objective of audit log processing is to review all actions to ensure they are made by authorized parties and for legitimate reasons.

At a minimum, audit records **must** be generated for all applicable events identified in Section 5.4.1 of this policy and **must** be available during audit reviews and third-party audits. For CAs operated in a virtual environment, audit records **must** be generated for all applicable events on application software and all system software layers.

Where possible, the security audit logs **must** be automatically collected. Where this is not possible, a logbook, paper form, or other physical mechanism **must** be used. All security audit logs, both electronic and non-electronic, **must** be retained and made available during compliance audits. Implementation and documentation of automated tools **must** describe how relevant events and anomalies are recorded.

Audit record reviews should be performed using an automated process and **must** include verification that the logs have not been tampered with, an inspection of log entries, and a root cause analysis for any alerts or irregularities.

A record of the review, all significant events, and any actions taken as a result of these reviews **must** be explained in an audit log summary. This review summary **must** be retained as part of the long-term archive.

When Key Escrow and Recovery is supported, all KED audit records of unsuccessful key recoveries **must** be analyzed to determine the cause and to ensure that the KRS is operating correctly and securely and is not vulnerable to unauthorized use.

Real-time alerts are neither required nor prohibited by this policy.

**5.4.1 Types of Events Recorded**

The following requirements apply to all DOS OPKI CAs.

All security auditing capabilities of CA operating system and CA applications required by this CP **must** be enabled during installation. At a minimum, each audit record **must** include the following (either recorded automatically or manually for each auditable event):

- What type of event occurred
- Date and time when the event occurred

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- Where the event occurred (e.g., on what systems or in what physical locations)
- Source of the event
- Outcome of the event to include success or failure. and
- Identity of any individuals, subjects, or objects/entities associated with the event.

Any request or action requiring the use of a private key controlled by the CA is an auditable event.

If out-of-band processes are used for authorization of certificate issuance, external artifacts from the process (e.g., forms, emails, etc.) **must** be recorded.

The CA and KRS **must** record the events identified in the table below, where applicable to the application, environment, or both. Where these events cannot be electronically logged, electronic audit logs **must** be supplemented with physical logs as necessary.

**Table 5-2 Auditable Event Requirements**

| <b>Auditable Event</b>                                                                                                  | <b>Rudimentary</b> | <b>Basic</b> | <b>Medium (All Policies) &amp; High</b> |
|-------------------------------------------------------------------------------------------------------------------------|--------------------|--------------|-----------------------------------------|
| <b>SECURITY AUDIT</b>                                                                                                   |                    |              |                                         |
| Any changes to the Audit parameters, e.g., audit frequency, type of event audited                                       |                    | X            | X                                       |
| Any attempt to delete or modify the Audit logs                                                                          |                    | X            | X                                       |
| <b>IDENTIFICATION AND AUTHENTICATION</b>                                                                                |                    |              |                                         |
| Platform or CA application-level authentication attempts                                                                |                    | X            | X                                       |
| The value of maximum authentication attempts is changed                                                                 |                    | X            | X                                       |
| The number of unsuccessful authentication attempts exceeds the <i>maximum authentication attempts</i> during user login |                    | X            | X                                       |
| An Administrator unlocks an account that has been locked as a result of unsuccessful authentication attempts            |                    | X            | X                                       |

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| Auditable Event                                                                                                                                                     | Rudimentary | Basic | Medium (All Policies) & High |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------|------------------------------|
| An Administrator changes the type of authenticator, e.g., from smart card login to password                                                                         |             | X     | X                            |
| <b>DATA ENTRY AND OUTPUT</b>                                                                                                                                        |             |       |                              |
| Any additional event that is relevant to the security of the CA (such as remote or local data entry or data export); <b>must</b> be documented                      |             | X     | X                            |
| <b>KEY GENERATION</b>                                                                                                                                               |             |       |                              |
| Whenever the CA generates a key. (Not <b>mandatory</b> for single session or one-time use symmetric keys)                                                           | X           | X     | X                            |
| <b>PRIVATE KEY LOAD AND STORAGE</b>                                                                                                                                 |             |       |                              |
| The loading of CA, RA, CSS, CMS, or other keys used by the CA in the lifecycle management of certificates                                                           | X           | X     | X                            |
| All access to certificate subject private keys retained within the CA for key recovery purposes                                                                     | X           | X     | X                            |
| <b>TRUSTED PUBLIC KEY ENTRY, DELETION AND STORAGE</b>                                                                                                               |             |       |                              |
| Any changes to public keys used by components of the CA to authenticate other components or authorize certificate lifecycle requests (e.g., RA or CMS trust stores) | X           | X     | X                            |
| <b>PRIVATE AND SECRET KEY EXPORT</b>                                                                                                                                |             |       |                              |
| The export of private and secret keys (keys used for a single session or message are excluded)                                                                      | X           | X     | X                            |
| <b>CERTIFICATE REGISTRATION</b>                                                                                                                                     |             |       |                              |

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| Auditable Event                                                                                                                                                                                                                                                                                       | Rudimentary | Basic | Medium (All Policies) & High |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------|------------------------------|
| All records related to certificate request authorization, approval and signature, whether generated directly on the CA or generated by a related external system or process. This includes records associated with authentication and authorization of Role Delegated Digital Signature certificates. | X           | X     | X                            |
| <b>CERTIFICATE STATUS CHANGE</b>                                                                                                                                                                                                                                                                      |             |       |                              |
| All records, including request, authorization, approval and execution related to certificate status changes (e.g., revocation, suspension, or restoration) whether generated directly on the CA or generated by a related external system or process.                                                 |             | X     | X                            |
| <b>CA CONFIGURATION</b>                                                                                                                                                                                                                                                                               |             |       |                              |
| Any security-relevant changes to the configuration of the CA. The specific configuration items relevant to the environment in which the CA operates <b>must</b> be identified and documented.                                                                                                         |             | X     | X                            |
| <b>ACCOUNT ADMINISTRATION</b>                                                                                                                                                                                                                                                                         |             |       |                              |
| Roles and users are added or deleted                                                                                                                                                                                                                                                                  | X           | X     | X                            |
| The access control privileges of a user account or a role are modified                                                                                                                                                                                                                                | X           | X     | X                            |
| <b>CERTIFICATE PROFILE MANAGEMENT</b>                                                                                                                                                                                                                                                                 |             |       |                              |
| All changes to the certificate profile                                                                                                                                                                                                                                                                | X           | X     | X                            |
| <b>CERTIFICATE REVOCATION LIST PROFILE MANAGEMENT</b>                                                                                                                                                                                                                                                 |             |       |                              |
| All changes to the certificate revocation list profile                                                                                                                                                                                                                                                |             | X     | X                            |
| <b>MISCELLANEOUS</b>                                                                                                                                                                                                                                                                                  |             |       |                              |

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| Auditable Event                                                                                                                                                                          | Rudimentary | Basic | Medium (All Policies) & High |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------|------------------------------|
| Record of an individual being added or removed from a trusted role, and who added or removed them from the role                                                                          | X           | X     | X                            |
| All records of authentication, authorization, recovery, agreement and delivery of key management keys to a key recovery requestor.                                                       | X           | X     | X                            |
| Installation of the Operating System                                                                                                                                                     |             | X     | X                            |
| Installation of the CA                                                                                                                                                                   |             | X     | X                            |
| Installing hardware cryptographic modules                                                                                                                                                |             |       | X                            |
| Removing hardware cryptographic modules                                                                                                                                                  |             |       | X                            |
| Destruction of cryptographic modules                                                                                                                                                     |             | X     | X                            |
| System Startup                                                                                                                                                                           |             | X     | X                            |
| Logon Attempts to CA Applications                                                                                                                                                        |             | X     | X                            |
| Receipt of Hardware/Software                                                                                                                                                             |             |       | X                            |
| Attempts to set passwords                                                                                                                                                                |             | X     | X                            |
| Attempts to modify passwords                                                                                                                                                             |             | X     | X                            |
| Backing up CA internal database                                                                                                                                                          |             | X     | X                            |
| Restoring CA internal database                                                                                                                                                           |             | X     | X                            |
| Records of manipulation of critical files (e.g., creation, renaming, moving), critical files will vary between installation, and <b>must</b> be identified in the relevant documentation |             |       | X                            |
| Posting of any material to a repository                                                                                                                                                  |             |       | X                            |
| The date and time any CA artifact is posted to a public repository                                                                                                                       |             |       | X                            |
| Access to CA internal database                                                                                                                                                           |             |       | X                            |

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| <b>Auditable Event</b>                                                                                                         | <b>Rudimentary</b> | <b>Basic</b> | <b>Medium (All Policies) &amp; High</b> |
|--------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------|-----------------------------------------|
| All certificate compromise notification requests                                                                               |                    | X            | X                                       |
| Loading tokens with certificates                                                                                               |                    |              | X                                       |
| Shipment and receipt of tokens containing key material, or tokens that allow access to key material (e.g., HSM operator cards) |                    |              | X                                       |
| Zeroizing tokens                                                                                                               |                    | X            | X                                       |
| Re-key of the CA                                                                                                               | X                  | X            | X                                       |
| Configuration changes to the CA server involving:                                                                              |                    |              |                                         |
| - Hardware                                                                                                                     |                    | X            | X                                       |
| - Software                                                                                                                     |                    | X            | X                                       |
| - Operating System                                                                                                             |                    | X            | X                                       |
| - Patches                                                                                                                      |                    | X            | X                                       |
| - Security Profiles                                                                                                            |                    |              | X                                       |
| <b>PHYSICAL ACCESS / SITE SECURITY</b>                                                                                         |                    |              |                                         |
| Personnel Access to room housing CA                                                                                            |                    |              | X                                       |
| Access to the CA server                                                                                                        |                    | X            | X                                       |
| Known or suspected violations of physical security                                                                             |                    | X            | X                                       |
| <b>ANOMALIES</b>                                                                                                               |                    |              |                                         |
| Software Error conditions                                                                                                      |                    | X            | X                                       |
| Software check integrity failures                                                                                              |                    | X            | X                                       |
| Equipment failure                                                                                                              | X                  | X            | X                                       |
| Electrical power outages                                                                                                       |                    |              | X                                       |

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| Auditable Event                                                        | Rudimentary | Basic | Medium (All Policies) & High |
|------------------------------------------------------------------------|-------------|-------|------------------------------|
| Uninterruptible Power Supply (UPS) failure                             |             |       | X                            |
| Network service or access failures that could affect certificate trust |             |       | X                            |
| Violations of Certificate Policy                                       | X           | X     | X                            |
| Violations of Certification Practice Statement                         | X           | X     | X                            |
| Resetting Operating System clock                                       |             | X     | X                            |

#### 5.4.2 Frequency of Processing Log

The CMA Information Systems Security Officer (ISSO), as well as an internal Auditor, **must** review the audit logs at least weekly for online CAs using a process that collects and displays audit logs.

For offline CAs, the audit logs **must** be reviewed when the system is activated or every 30 days, whichever is later. CSS, CMS, IDMS, and KRS audit log processing frequency **must** align with the CA audit log processing frequency.

Administrators **must** retrieve PKI and operating system audit logs for the PKI Auditor. The review of audit logs by the Auditor **must** assess the security ramifications of the log events and availability of the audit logs to determine the confidence of security audit data, and include a reasonable search for any evidence of malicious activity.

The review of audit logs involves verifying that the log has not been tampered with, and at a minimum briefly inspecting all log entries, with a more thorough investigation of any alerts or irregularities in the logs (e.g., discontinuities, data loss). The ISSO and/or auditors **must** document actions taken because of these reviews, and report to the DOS PKI PMA and DOS PKI OA and any other appropriate authorities and entities in the same manner as outlined in Sections 8.5.

#### 5.4.3 Retention Period for Audit Logs

For Basic, Medium, Medium Hardware, and High Assurance CAs, the CMA **must** retain audit logs on-site until reviewed, as well as archiving such logs in the manner described in Section 5.5.

The CMA-equipment **must** retain the security audit information it generates for at least two months, as outlined in Section 5.4.4, 5.4.5 and 5.4.6, until moved to an appropriate archive facility.

An entity other than the CMA (i.e., officials different from the individuals who, in combination, command the CA signature key) **must** delete the security audit data from the CMA-equipment.

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The CMA **must** retain security audit data as archive records in accordance with Section 5.5.

**5.4.4 Protection of Audit Logs**

System configuration and operational procedures **must** be implemented together to ensure that only authorized individuals may move or archive audit records and that audit records are not modified.

Collection of the audit records from the CA system **must** be performed by, witnessed by or under the control of trusted roles who are different from the individuals who, in combination, command the CA signature key.

For RA systems, the individual authorized to move or archive records **may not** hold an RA Trusted Role.

Procedures **must** be implemented to protect audit records from deletion or destruction before they are reviewed, as described in Section 5.4.2. To protect the integrity of audit records, they **must** be transferred to a backup environment distinct from the environment where the audit records are generated.

The CMA **must** implement procedures to transfer the security audit data to secure storage before overwriting or overflow of automated security audit log files.

The security audit data **must not** be accessible to or opened by any person, or by any automated process, other than those trusted roles that perform or support security audit processing. The CMA **must** implement CA system configuration and procedural controls to ensure that:

- Only personnel assigned to trusted roles have read access to the logs
- Only authorized people may copy, move, delete, or archive audit logs
- Audit logs are not modified

Procedures **must** be implemented to protect archived data from deletion or destruction before the end of the security audit data retention period. The entity responsible for archiving PKI records **must** move security audit data to a safe, secure storage location separate from the CMA-equipment location where the data was generated, pending its transfer to the official archive location.

**5.4.5 Audit Log Backup Procedures**

Audit records and audit summaries **must** be backed up at least monthly.

If audit records are stored locally in the system where the events occur, they **must** be transferred to a backup environment and protected as described in Section 5.4.4. The backup procedure may be automated or manual but **must** occur no less frequently than the audit log review described in Section 5.4.2.

The process for transferring the audit records to the backup environment **must** be documented.

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**UNCLASSIFIED****5.4.6 Audit Collection System (Internal vs. External)**

The audit log collection system may or may not be external to the CA system or KRS.

Audit processes (automated and manual) **must** be invoked at system (or application) startup and cease only at system (or application) shutdown.

Audit collection systems **must** be configured such that security audit data is protected against loss (e.g., overwriting or overflow of automated log files).

The audit process **must** run independently, and the CMA **must not** control it in any way, except to control at installation the implementation of audit data generation and collection capabilities.

In the event that the automated audit system fails, and the integrity of the system or confidentiality of the information protected by the system is at risk, the CMA **must** cease all operations, except for revocation processing, until it can restore the security audit capability. Under these circumstances, the CMA **must** employ mechanisms to preclude unauthorized CMA functions. The CPS **must** describe these mechanisms.

**5.4.7 Notification to Event-Causing Subject**

This CP imposes no requirement to notify a subject that an event was audited. Real-time alerts are neither required nor prohibited by this policy.

**5.4.8 Vulnerability Assessments**

CAs **must** perform routine vulnerability assessments of the security controls described in the applicable policy.

The CMA, system administrator, and other operating personnel **must** routinely assess whether the CA system or its components have been attacked, breached, or whether attempts occurred to violate the integrity of the certificate management system, including the equipment, physical location, and personnel.

Self-assessment of controls and control effectiveness (e.g., FISMA) **must** be performed in accordance with the frequency determined by the risk rating of the CA.

Automated vulnerability scans, if executed, should be run no less frequently than required by the risk rating of the component.

The methodology, tools and frequency of the vulnerability assessment **must** be documented.

An auditor trusted role **must** review security audit data for events such as repeated failed actions, requests for privileged information, attempted access of system files, requests for escrowed keys, attempted access of escrowed keys, unauthenticated responses, and other suspicious or unusual activity. An auditor trusted role should check for continuity of the security audit data.

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**5.5 RECORDS ARCHIVE****5.5.1 Types of Events Archived**

CMA archive records<sup>10</sup> **must** collect and maintain sufficient detail to establish that the DOS OPKI CAs were properly operated in accordance with this policy, as well as verifying the validity of any certificate (including revoked and/or expired) issued by the CAs. At a minimum, the following data **must** be recorded for archive as specified for each assurance level in Table 5-4 below:

**Table 5-3 Data Archival Requirements**

| <b>Data To Be Archived</b>                                                                                                                                                                                                                                                              | <b>Rudimentary</b> | <b>All Other Policies</b> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------|
| Certificate Policy                                                                                                                                                                                                                                                                      | X                  | X                         |
| Certification Practice Statement / Key Recovery Practice Statement                                                                                                                                                                                                                      | X                  | X                         |
| Contractual obligations                                                                                                                                                                                                                                                                 | X                  | X                         |
| Other agreements concerning operations of the CA or KRS                                                                                                                                                                                                                                 | X                  | X                         |
| System and equipment configuration                                                                                                                                                                                                                                                      | X                  | X                         |
| Modifications and updates to system or configuration                                                                                                                                                                                                                                    | X                  | X                         |
| All records related to certificate request authorization, approval and signature, whether generated directly on the CA or generated as part of a related external system or process. This includes records associated with authentication and authorization of role-based certificates. | X                  | X                         |
| All records related to certificate status changes (e.g., revocation, suspension, or restoration) whether generated directly on the CA or generated as part of a related external system or process                                                                                      |                    | X                         |
| Subscriber identity Authentication data as per Section 3.2.3                                                                                                                                                                                                                            |                    | X                         |
| Documentation of receipt and acceptance of certificates (if applicable)                                                                                                                                                                                                                 |                    | X                         |

<sup>10</sup> The term “archive” is not to be confused with a routine backup. The archive addressed in this section is a long-term storage of data that is critical as a historical record. See the terms “archive” and “backup” in this document’s Glossary.

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Table 5-3 Data Archival Requirements

| Data To Be Archived                                                                                                                                                                                 | Rudimentary | All Other Policies |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------|
| Subscriber Agreements, including agreements signed by subscribers who are recipients of role-based certificates and keys.                                                                           |             | X                  |
| All shared key access lists and shared key user agreements supporting group encryption certificates must be provided by the group sponsor to the CA or RA upon certificate revocation or expiration |             | X                  |
| Documentation of receipt of tokens                                                                                                                                                                  |             | X                  |
| All certificates issued or published                                                                                                                                                                | X           | X                  |
| Record of CA Re-key                                                                                                                                                                                 | X           | X                  |
| Other data or applications to verify archive contents                                                                                                                                               |             | X                  |
| Audit summary reports generated by internal reviews and documentation generated during third party audits                                                                                           |             | X                  |
| Any changes to the Audit parameters, e.g., audit frequency, type of event audited                                                                                                                   |             | X                  |
| Any attempt to delete or modify the Audit logs                                                                                                                                                      |             | X                  |
| Whenever the CA generates a key. (Not mandatory for single session or one-time use symmetric keys)                                                                                                  | X           | X                  |
| All access to certificate subject private keys retained for key recovery purposes                                                                                                                   | X           | X                  |
| Changes to trusted public keys used or published by the CA including certificates used for trust between the CA and other components such as CMS, RA, etc.                                          | X           | X                  |
| The export of private and secret keys (keys used for a single session or message are excluded)                                                                                                      | X           | X                  |
| The approval or rejection of a certificate status change request                                                                                                                                    |             | X                  |

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Table 5-3 Data Archival Requirements

| Data To Be Archived                                                                                                                                                       | Rudimentary | All Other Policies |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------|
| Record of an individual being added or removed from a trusted role, and who added or removed them from the role                                                           | X           | X                  |
| Evidence of qualification for Local Registration Authorities and the associated validity period(s) for which they are authorized to act as Local Registration Authorities |             | X                  |
| Records of the destruction of sensitive keys and cryptographic modules                                                                                                    |             | X                  |
| All certificate compromise notifications                                                                                                                                  |             | X                  |
| Remedial action taken as a result of violations of physical security                                                                                                      |             | X                  |
| Violations of Certificate Policy                                                                                                                                          | X           | X                  |
| Violations of Certification Practice Statement                                                                                                                            | X           | X                  |

### 5.5.2 Retention Period for Archive

Archive retention periods begin at the key generation event for any CA. For CAs that leverage key-rollover procedures a new retention period begins for each subsequent key generation event.

CAs **must** maintain all archived records related to that CA, in an accessible fashion, for 3 years after CA expiration or CA termination.

Individual RA records associated with certificate request authorization, certificate revocation, subscriber authentication, or subscriber certificate acceptance **must** be maintained for a minimum of 3 years after the subject certificate expiration date. Issuance of new certificates with extended validity periods (i.e., renewal, rekey or modification) supported by existing subscriber authentication records (i.e., authentication using an existing valid certificate) will result in a new retention period for those initial records, based on the new certificate expiration date.

National Archives and Records Administration General Records Schedules [NARA GRS], 5.6 Item 120, defines **required** enrollment chain-of-trust records, and archive retention periods related to credentials issued in support of HSPD-12.

RA system operations audit records, that include any IT resources that facilitate RA functions, **must** maintain relevant archives for a minimum of 3 years after RA system replacement or termination.

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**5.5.3 Protection of Archive**

Only authorized users are **permitted** to access the archive. The CMA **must** maintain a list of people authorized to access the archive.

Only Auditor trusted roles, as described in Section 5.2, or other personnel specifically authorized by the DOS PKI OA, are **permitted** to add to or delete records from the archive. Deletion of records identified in Section 5.5.1 before the end of the retention period is not permitted under any circumstances. The CMA **must** maintain a list of people authorized to modify or delete records from the archive.

Archive media **must** be stored in a safe, secure storage facility geographically separate from the CA in accordance with its records retention policies. The transfer process between the backup environment and archive location **must** be documented. Before archiving, the CMA **must** label archive records with the name, the date, and the classification of the information. The DOS Data Archive Policy and Procedure **must** contain procedures detailing how to create, package, and send archive information.

If the original media cannot retain the data for the required period, the DOS PKI OA **must** define a mechanism to transfer the archived data to new media periodically.

In order to ensure that records in the archive may be referenced when required, the CMA **must** do one of the following:

- Maintain the hardware or software required to process or read the archive records, or
- Define a process to transfer records to a new format or medium when the old format or medium becomes obsolete and verify the integrity of the records after transfer

The CMA and the archive site **must not** release the contents of the archive except: (1) in accordance with Department policy; or, (2) as required by law (See Sections 9.3 and 9.4). The CMA may release records of individual transactions upon request of any Subscribers involved in the transaction (i.e., originator or recipient), or their legally recognized agents.

The CMA will coordinate with Department Records Management Officials (A/RPS/IPS/PP) to ensure the scheduling and disposition approval by the NARA of all PKI archived records.

**5.5.4 Archive Backup Procedures**

If archive records are backed up, the CPS or a referenced document **must** describe how the archive records are backed up and managed.

**5.5.5 Requirements for Timestamping of Records**

DOS OPKI CA archive records **must** have accurate timestamps when they are created. The time precision **must** be such that the sequence of events can be determined.

The CPS **must** describe how system clocks used for timestamping are maintained in synchrony with an authoritative time standard.

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**UNCLASSIFIED****5.5.6 Archive Collection System (Internal or External)**

The DOS OPKI CA systems, or the CMA staff, may collect archive data in any expedient manner, **provided** the collection process is documented in the associated CPS.

**5.5.7 Procedures to Obtain and Verify Archive Information**

The DOS Data Archive Policy and Procedure **must** describe procedures detailing how to create, verify, package, transmit, and store archive information.

The CMA **must not** release the contents of the archive except as determined by the DOS PKI PMA or as required by law. The CMA or archive site may release records of individual transactions upon request of any Subscribers involved in the transaction, or their legally recognized agents.

**5.6 KEY CHANGEOVER**

Each CA's signing key **must** have a validity period as described in Section 6.3.2.

Prior to the end of a CA's signing key validity period, a new CA **must** be established or a re-key on the existing CA **must** be performed. This is referred to as key changeover. From that time on, only the new key is used to sign CA and Subscriber certificates. The old private key may continue to be used to sign CRLs and OCSP Responder certificates. If the old private key is used to sign OCSP Responder certificates or CRLs that cover certificates signed with that key, the old key **must** be retained and protected.

After all certificates signed with the old key have expired or been revoked, the CA may issue a final long-term CRL using the old key, with a nextUpdate time past the validity period of all issued certificates. This final CRL **must** be available for all relying parties until the validity period of all issued certificates has passed. Once the last CRL has been issued, the old private signing key of the CA may be destroyed.

When a CA performs a key changeover and thus generates a new public key, the CA **must** notify all CAs, RAs, and Subscribers that rely on the CA's certificate that it has been changed. The CA **must** do one of the following:

- Generate key rollover certificate, where the new public key is signed by the old private key, and vice versa or
- Obtain a new CA certificate for the new public key from each issuer of the current CA certificate(s)

**5.7 COMPROMISE AND DISASTER RECOVERY**

CAs **must** have an incident handling process, which documents any security incidents. Security incidents may include violation or threat of violation to the system, improper usage, malicious or anomalous activity, and violations of the CPS or CP.

**UNCLASSIFIED****5.7.1 Incident and Compromise Handling Procedures**

The DOS PKI OA **must** notify the DOS PKI PMA and the FPKIPA within 24 hours if a DOS OPKI CA experiences any the following:

- Suspected or detected compromise of the CA systems
- Physical or electronic penetration of CA systems
- Successful denial of service attacks on CA components
- Any incident preventing the CA from issuing a CRL prior to the nextUpdate time of the previous CRL
- Suspected or detected compromise of a CSS
- Suspected or detected compromise of an RA.

The notification **must** include preliminary remediation analysis.

Once the incident has been resolved, DOS PKI OA **must** provide notification directly to the DOS PKI PMA and the FPKIPA which includes detailed measures taken to remediate the incident.

The notice **must** include the following:

1. Which CA components were affected by the incident
2. The CA's interpretation of the incident
3. Who is impacted by the incident
4. When the incident was discovered
5. A complete list of all certificates that may have been issued erroneously or are not compliant with the CP/CPS because of the incident
6. A statement that the incident has been fully remediated.

The DOS PKIPO **must** reestablish operational capabilities as quickly as possible in accordance with procedures set forth in the DOS OPKI CA's CPS.

**5.7.2 Computing Resources, Software, and/or Data Are Corrupted**

When computing resources, software, and/or data are corrupted, the affected DOS OPKI CAs **must** respond as follows:

- The DOS PKI OA **must** post a notice on its web page identifying the incident and provide notification to the FPKIPA. See Section 5.7.1 for contents of the notice.
- Before returning to operation, the CMA **must** ensure that system integrity has been restored; and **must** notify the DOS PKI OA and DOS PKI PMA
- If the CA signature keys are not destroyed, CA operation **must** be reestablished, giving priority to the ability to generate certificate status information within the CRL issuance schedule specified in Section 4.9.7

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- If the CA signature keys are destroyed, CA operation **must** be reestablished as quickly as possible, giving priority to the generation of a new CA key pair.

**5.7.3 Entity (CA) Private Key Compromise Procedures****5.7.3.1 CA Private Key Compromise Procedures**

In the event of a CA private key compromise, the following operations **must** be performed:

- The DOS PKI OA **must** immediately inform the FPKIPA, and any entities known to be distributing the CA certificate (e.g., in a root store).
- The DOS PKI OA **must** request revocation of any certificates issued to the compromised CA.
- The DOS PKI OA **must** generate new keys in accordance with Section 6.1.1.1.

If the CA distributed the public key in a Trusted Certificate, the CA **must** perform the following operations:

- Generate a new Trusted Certificate.
- Securely distribute the new Trusted Certificate as specified in Section 6.1.4.
- Initiate procedures to notify Subscribers of the compromise.

Subscriber certificates issued prior to compromise of the CA private key may be renewed automatically by the CA under the new key pair (see Section 4.6) or the CA may require Subscribers to repeat the initial certificate application process.

The DOS PKI OA **must** investigate and report to the DOS PKI PMA and the FPKIPA what caused the compromise or loss.

The applicable CPS **must** document more detailed procedures for responding to compromise of the private key of the DOS OPKI AD Root CA and its Subordinate CAs.

**5.7.3.2 KRS Private Key Compromise Procedures**

In the event that the KED is compromised or is suspected to be compromised, the following operations **must** be performed:

- Notify the FPKIPA of the compromise
- Provide detail concerning the root cause, operational impact, and initial remediation actions
- Determine the extent of the compromise
- Gain concurrence from the FPKIPA on planned resolution. This may include revocation of certificates associated with the compromised private keys stored in the KED.

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If a KRA or KRO certificate is revoked due to compromise, the potential exists for some Subscribers' escrowed keys to have been exposed during a recovery process, the following operations **must** be performed:

- Audit record review by the audit administrator to identify all potentially exposed escrowed keys.
- Revocation of each of the potentially exposed escrowed keys, according to procedures specified in Section 4.9.3, to include Subscriber notification of the revocation
- Reissuance of the KRA or KRO authentication certificate

The applicable CPS **must** document more detailed procedures for responding to compromise of the KRS.

**5.7.4 Business Continuity Capabilities after a Disaster**

The CA repository system **must** be deployed to provide 24-hour, 365 day per year availability with high levels of repository reliability.

CAs **must** have recovery procedures in place to reconstitute the CA after failure.

In the case of a disaster whereby the CA installation is physically damaged, and all copies of the CA signature key are destroyed as a result, the FPKIPA **must** be notified at the earliest feasible time, and the FPKIPA **must** take whatever action it deems appropriate.

The applicable CPS **must** document more detailed business continuity procedures.

**5.8 CA AND RA TERMINATION**

Whenever possible, the FPKIPA **must** be notified at least two weeks prior to the termination of a DOS OPKI CA. For emergency termination, DOS OPKI CA s **must** follow the notification procedures in Section 5.7.

In the event the decision is made to terminate a DOS OPKI CA, the following **must** be accomplished prior to termination:

- Notify all cross-certified Entities.
- Revoke any issued certificates that have not expired<sup>11</sup>
- Generate and publish a final long term CRL with a nextUpdate time past the validity period of all issued certificates. This final CRL **must** be available for all relying parties until the validity period of all issued certificates has passed.
- Once the last CRL has been issued, destroy the private signing key(s) of the DOS OPKI CA.

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<sup>11</sup> If the termination is for convenience, contract expiration, re-organization, or other non-security related reason, and provisions have been made to continue compromise recovery, compliance and security audit, archive, and data recovery services; then neither the terminated CA's certificate, nor certificates signed by that CA, need to be revoked.

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- Transfer all archive data to an archival facility.

The applicable CPS **must** document more detailed procedures for termination of the DOS OPKI AD Root CA and its Subordinate CAs.

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## 6. TECHNICAL SECURITY CONTROLS

### 6.1 KEY PAIR GENERATION AND INSTALLATION

#### 6.1.1 Key Pair Generation

Key generation **must** be performed using a FIPS approved method or equivalent international standard, with the exception of subscriber rudimentary keys. Key generation events should use the configuration that was the basis of the FIPS or other approved standard (e.g., FIPS mode). If the required keys cannot be generated while in an approved configuration, the specific configuration and reason for use of a different method should be documented by the CA.

This policy does not preclude any source of key generated in accordance with the stipulations of this policy and local security requirements. A private key **must not** appear outside of the cryptographic module in which it was generated unless encrypted for local transmission or for processing or storage by a key recovery mechanism. Section 6.1.1.1 defines requirements for cryptographic modules used for key generation and storage.

##### *6.1.1.1 CA Key Pair Generation*

The DOS PKI AD Root CA, subordinate CAs, and CSSs **must** generate cryptographic keying material used to sign certificates, CRLs or status information in FIPS 140 validated cryptographic modules as specified in Section 6.2.1. Multiparty control is **required** for CA key pair generation, as specified in Section 5.2.2.

The DOS OPKI AD Root and subordinate CAs **must** document their initial key generation procedures and their re-key generation procedures in a Key Generation Ceremony (KGC) document. The purpose of the KGC document is to document the initial integrity of a new CA or re-keyed CA.

The KGC document **must** include:

- A detailed step-by-step script that is used to:
  - Establish the identity of participants and Trusted Roles held by the participants,
  - Establish the integrity of the hardware that will be used to host sensitive systems, including the CA and the HSM,
  - Establish the integrity of all software that will be installed,
  - Install and configure all sensitive systems, including the underlying operating system,
  - Generate the CA Signing Key,
  - Document the secure storage of cryptographic and other sensitive materials that were used or created during the KGC, and
  - Ensure that the required role separation is maintained.

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- A description of the physical security measures employed to control physical access to sensitive PKI systems, and
- A description of the measures employed establish and maintain the integrity of the underlying PKI infrastructure.

The KGC document **must** be approved for use by the DOS PKI OA before it is executed.

The execution of the KGC document **must** be witnessed by an individual appointed to the PKI Auditor trusted role and by an independent third party with audit experience. The witnesses **must** initial each step of the KGC document attesting to its completion as documented.

**6.1.1.2 Subscriber Key Pair Generation**

The Subscriber, RA, or CA may perform Subscriber key pair generation. If the CA or RA generates Subscriber key pairs, the requirements for key pair delivery specified in Section 6.1.2 **must** be met.

For certificates at the High and Medium Hardware assurance levels, subscriber key generation **must** be performed using a validated hardware cryptographic module as specified in Section 6.2.1. For Medium and Basic assurance, either validated software or validated hardware cryptographic modules **must** be used for key generation as specified in Section 6.2.1.

**6.1.1.3 CSS Key Pair Generation**

Cryptographic keying material used by CSSs to sign status information **must** be generated in [FIPS 140] validated cryptographic modules as specified in Section 6.2.1.

**6.1.1.4 PIV-I Content Signing Key Pair Generation**

The DOS OPKI does not issue certificates for PIV-I cards as defined in the FBCA CP.

Note: Requirements for PIV Content Signing Key Pair Generation are addressed in the FCPF CP.

**6.1.2 Private Key Delivery to Subscriber**

If Subscribers generate their own key pairs, then there is no need to deliver private keys, and this section does not apply.

When a CA or RA generates keys on behalf of the Subscriber, the CMA **must** implement mechanisms to ensure that the public/private key pair is securely delivered to the proper Subscriber. Private keys may be delivered electronically or delivered on a hardware cryptographic module.

For High and Medium Hardware assurance, a private key will be generated and **must** remain within the cryptographic boundary of a cryptographic module. If the CMA generates the key, then the CMA **must** securely deliver the cryptographic module containing the key to the Subscriber. The CMA **must** implement procedures to ensure that the cryptographic module is not

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activated by an unauthorized Entity. The Subscriber **must** formally acknowledge receipt of the cryptographic module, and the CMA **must** maintain a record of the Subscriber acknowledgement of receipt.

If the private key is delivered electronically over a network to the Subscriber, it **must** be through an encrypted and authenticated channel directly to the Subscriber's cryptographic module.

In all cases, the following requirements **must** be met:

- Anyone who generates a private signing key for a Subscriber **must not** retain any copy of the key after delivery of the private key to the Subscriber.
- The private key **must** be protected from activation, compromise or modification during the delivery process.
- The Subscriber **must** acknowledge receipt of the private key.
- Delivery **must** be accomplished in a way that ensures that the correct tokens and activation data are provided to the correct Subscribers.
  - For hardware modules, accountability for the location and state of the module **must** be maintained until the Subscriber accepts possession of it.
  - For electronic delivery of private keys, the key material **must** be encrypted using a cryptographic algorithm and key size at least as strong as the private key. Activation data **must** be delivered using a separate secure channel.
  - For shared key applications, organizational identities, and network devices, also see Sections 3.2 and 3.3.

**6.1.3 Public Key Delivery to Certificate Issuer**

For DOS OPKI CAs operating at the Basic, Medium, Medium Hardware, or High level of assurance, the following requirements apply:

- Where key pairs are generated by the Subscriber or RA, the public key and the Subscriber's identity **must** be delivered securely in an authenticated manner to the CA for certificate issuance.
- The delivery mechanism **must** bind the Subscriber's verified identity to the public key. If cryptography is used to achieve this binding, it **must** be at least as strong as the CA keys used to sign the certificate. Alternatively, this binding may be accomplished through in-person appearance before the RA, LRA or trusted agent.

For Rudimentary Assurance, this CP makes no stipulation.

**6.1.4 CA Public Key Delivery to Relying Parties**

When a DOS OPKI CA updates its signature key pair, the CA **must** distribute the new public key in a secure fashion to Relying Parties. The CA may distribute the new public key in a self-signed certificate, in a key rollover certificate, or in a new CA (e.g., cross) certificate obtained from the issuer(s) of the current CA certificate(s).

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DOS OPKI AD Root CA **must** make its public key available to Relying Parties, for the creation and verification of certification trust paths, in the form of a self-signed public-key certificate. The DOS OPKI AD Root CA **must** deliver this self-signed certificate to Subscribers in a manner commensurate with the security offered by the public key in the certificate. The self-signed certificate **must** be conveyed to relying parties in a secure fashion to preclude substitution attacks. Acceptable methods include, but are not limited to the following:

- Loading a self-signed certificate onto tokens delivered to Relying Parties via secure mechanisms
- Distribution of self-signed certificates through secure out-of-band mechanisms
- Comparison of certificate hashes against trusted certificate hashes made available via authenticated out-of-band sources (note that hashes posted in-band along with the certificate are not acceptable as an authentication mechanism)
- Downloading certificates from web sites secured with a currently valid certificate of equal or greater assurance level than the certificate downloaded

DOS OPKI CAs **must** sign key rollover certificates with the CA's current private key, so secure distribution is not required.

**6.1.5 Key Sizes**

RSA PKCS #1, RSASSA-PSS, or ECDSA signature schemes **must** be used. Additional **restrictions** on key sizes and hash algorithms are detailed in Tables 6-1 and 6-2. Certificates **must** contain 2048 bit, 3072 bit, or 4096 bit RSA keys, or 256 or 384 bit elliptic curve keys. CAs that generate certificates and CRLs under this policy **must** use the SHA-256, SHA-384, or SHA-512 hash algorithm when generating digital signatures.

**Table 6-1 CA Key Size and Hash Algorithm Restrictions**

|                  | <b>CA Certificates That Expire On Or Before December 31, 2030</b> | <b>CA Certificates That Expire After December 31, 2030</b> |
|------------------|-------------------------------------------------------------------|------------------------------------------------------------|
| Minimum Key Size | RSA: 2048<br>Elliptic Curve: 256                                  | RSA: 3072<br>Elliptic Curve: 256                           |
| Hash Algorithm   | SHA-256, SHA-384, or SHA-512                                      | SHA-256, SHA-384, or SHA-512                               |

**Table 6-2 Subscriber Key Size and Hash Algorithm Restrictions**

|                  | <b>Subscriber Certificates That Expire On Or Before December 31, 2030</b> | <b>Subscriber Certificates That Expire After December 31, 2030</b> |
|------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------|
| Minimum Key Size | RSA: 2048<br>Elliptic Curve: 256                                          | RSA: 3072<br>Elliptic Curve: 256                                   |

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|                |                              |                              |
|----------------|------------------------------|------------------------------|
| Hash Algorithm | SHA-256, SHA-384, or SHA-512 | SHA-256, SHA-384, or SHA-512 |
|----------------|------------------------------|------------------------------|

Where implemented, CSSs **must** sign responses using the same signature algorithm, key size, and hash algorithm used by the CA to sign CRLs.

Use of Transport Layer Security (TLS) or another protocol providing similar security to accomplish any of the requirements of this CP **must** require at a minimum AES (128 bits) or equivalent for symmetric key, and at least 2048 bit RSA or equivalent for the asymmetric keys. After 12/31/2030, use of TLS or another protocol providing similar security to accomplish any of the requirements of this CP **must** require at a minimum AES (128 bits) or equivalent for the symmetric key, and at least 3072 bit RSA or equivalent for the asymmetric keys.

KED and DDS keys **must** be at equal to or stronger than the keys being escrowed.

### 6.1.6 Public Key Parameters Generation and Quality Checking

For RSA, the CA **must** perform partial public key validation as specified in NIST SP 800-89 (Section 5.3.3).

For ECC, public keys **must** fall within curves defined in Section 7.1.3. Additionally, the CA should confirm the validity of all keys using either the ECC Full Public Key Validation Routine or the ECC Partial Public Key Validation Routine as specified in NIST SP 800-56A (Sections 5.6.2.3.3, or 5.6.2.3.4).

### 6.1.7 Key Usage Purposes (as per X.509 v3 Key Usage Field)

DOS OPKI CAs **must** certify public keys bound into certificates for use in signing or encrypting, but not both, except as specified below. The use of a specific key is determined by the key usage extension in the X.509 certificate.

All certificates **must** include a critical Key Usage extension:

- Certificates to be used only for authentication **must** set only the digitalSignature bit.
- Certificates to be used by Human Subscribers for digital signatures **must** set the digitalSignature and nonRepudiation bits.
- Certificates that have the nonRepudiation bit set, **must not** have keyEncipherment bit or keyAgreement bit set.
- Certificates to be used for encryption (RSA) **must** set the keyEncipherment bit.
- Certificates to be used for key agreement (ECC) **must** set the keyAgreement bit.
- CA certificates **must** set only cRLSign and keyCertSign bits.
- OCSP Responder certificates **must** assert the digitalSignature and/or nonRepudiation bits

Keys associated with CA certificates **must only** be used for signing certificates and CRLs.

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Subscriber certificates **must** assert key usages based on the intended application of the key pair. Subscriber certificates to be used for digital signatures (including authentication) **must** set the *digitalSignature* and/or *nonRepudiation* bits. However, a public-key certificate with key usage set for *digitalSignature* and *keyEncipherment* **must not** also set for *nonRepudiation*. Certificates issued only for Authentication **must only** set the *digitalSignature* bit. Certificates to be used for key or data encryption **must** set the *keyEncipherment* and/or *dataEncipherment* bits. Certificates used for key encryption **must** set the *keyAgreement* bit if the algorithm is DH and **must** set the *keyEncipherment* bit if the algorithm is RSA. This restriction does not prohibit use of protocols that provide authenticated connections using key management certificates. Certificates to be used for key agreement **must** set the *keyAgreement* bit.

Keys associated with Device Subscriber certificates may be used for digital signature (including authentication), encryption, or both. Except for OCSP Responder certificates, device certificates **must not** assert the *nonRepudiation* bit.

Group certificates **must only** set the *digitalSignature* bit.

Rudimentary, Basic, and Medium Assurance Level certificates may include a single key for use with encryption and signature in support of legacy applications. DOS OPKI CAs **must** generate and manage such dual-use certificates in accordance with their respective signature certificate requirements, except where otherwise noted in this CP. Such dual-use certificates **must never** assert the non-repudiation key usage bit, and **must not** be used for authenticating data that will be verified based on the dual-use certificate at a future time.

At all levels of assurance DOS OPKI CAs **must** issue Subscribers two key pairs, i.e., one for key management and one for digital signature, except where operationally necessary (e.g., VPN and web site/application access control). This restriction does not prohibit use of protocols that provide authenticated connections using key management certificates.

For Subscriber certificates issued after June 30, 2019, the Extended Key Usage extension **must** always be present and **must not** contain *anyExtendedKeyUsage* {2.5.29.37.0}. Extended Key Usage OIDs **must** be consistent with key usage bits asserted.

If a certificate is used for authentication of ephemeral keys<sup>12</sup>, the Key Usage bit in the certificate **must** assert the Digital Signature bit and may or may not assert Key Encryption and Key Agreement depending on the public key in the certificate.

## 6.2 PRIVATE KEY PROTECTION AND CRYPTOGRAPHIC MODULE ENGINEERING CONTROLS

### 6.2.1 Cryptographic Module Standards and Controls

The relevant standard for cryptographic modules is [FIPS 140], *Security Requirements for Cryptographic Modules*. A FIPS 140 Level 1 or higher validated cryptographic module **must** be used for all cryptographic operations.

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<sup>12</sup> Example: A session key

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Cryptographic modules **must** be minimally validated to the FIPS 140 level identified in this section. An exception may be made only for key recovery of Hardware Subscriber Key Management Key(s) when dictated by extenuating circumstances required by a Third-Party Requestor in alignment with legal or technical requirements.

Table 6-3 below summarizes the minimum FIPS 140 **requirements** for cryptographic modules; higher levels may be used.

**Table 6-3 Minimum FIPS 140 Validation Requirement for Cryptographic Modules**

| <b>Assurance Level</b> | <b>CA</b>          | <b>CMS &amp; CSS</b> | <b>Subscriber / Content Signer</b>            | <b>RA</b>          |
|------------------------|--------------------|----------------------|-----------------------------------------------|--------------------|
| Rudimentary            | Level 1            | Level 1              | N/A                                           | Level 1            |
| Basic                  | Level 2            | Level 2              | Level 1                                       | Level 1            |
| Medium                 | Level 3 (Hardware) | Level 2 (Hardware)   | Level 1                                       | Level 2 (Hardware) |
| Medium Hardware        | Level 3 (Hardware) | Level 2 (Hardware)   | Level 2 (Hardware)<br>Level 1* (Key Recovery) | Level 2 (Hardware) |
| High                   | Level 3 (Hardware) | Level 2 (Hardware)   | Level 2 (Hardware)                            | Level 2 (Hardware) |

\*When necessary for completing an authenticated and authorized Third-Party key recovery request (e.g., in support of an investigation), Hardware Subscriber Key Management Key(s) can be recovered into a Level 1 module or an encrypted file (.p12 or .pfx) provided there is organizational approval based on the acceptance of risk to data encrypted with the associated public keys.

All instances of recovered keys must be destroyed as early as practicable in consultation with the Third-Party Recovery Requestor (e.g., after required data has been decrypted). See Sections 4.12 and 6.2.6 for additional key recovery requirements to include secure transport.

### **6.2.1.1 Custodial Subscriber Key Stores**

Custodial Subscriber Key Stores hold keys for several Subscriber certificates in one location. When a collection of private keys for Subscriber certificates are held in a single location, there is

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a higher risk associated with compromise of that cryptographic module than that of a single Subscriber.

Cryptographic modules for Custodial Subscriber Key Stores at the Rudimentary Assurance Level **must** be no less than FIPS 140 Level 1 (Hardware or Software). For all other levels, the cryptographic module **must** be no less than FIPS 140 Level 2 Hardware.

In addition, authentication to the Cryptographic Device in order to activate the private key associated with a given certificate **requires** authentication commensurate with the assurance level of the certificate.

**6.2.2 Private Key Multi-Person Control**

For the DOS OPKI AD Root CA, the generation, backup, and activation of the private signing key requires action by two or more persons as set forth in Section 5.2.2 of this CP.

For the DOS OPKI Subordinate CAs operating at Medium, Medium Hardware, and High Assurance, the generation, backup, and activation of the private signing key requires action by two or more persons as set forth in Section 5.2.2 of this CP.

For the DOS OPKI KED escrowing Medium, Medium Hardware, and High Assurance private decryption keys, the generation, backup, and activation of the private key requires action by two or more persons as set forth in Section 5.2.2 of this CP.

Auditable records **must** be generated for CA private signing key, and KED private decryption key generation, backup, and activation that document that the required multi-person controls were enforced.

The CMA **must** maintain a list of names of the parties used for multi-person control.

**6.2.3 Private Key Escrow****6.2.3.1 Escrow of DOS Root CA and Subordinate CA Private Signature Keys**

DOS OPKI CA private signature keys **must not** be escrowed.

**6.2.3.2 Escrow of CA Encryption Keys**

DOS OPKI AD Root CA **must not** perform any encryption key recovery functions involving encryption keys issued to subordinate CAs. However, if encryption key pairs need to be issued by the AD Root CA covering repository system access or for other purposes, the DOS PKI PMA **must** publish applicable requirements for that purpose.

Subordinate CAs may escrow any encryption keys whose certificates do not contain the *digitalSignature* key usage bit for the purpose of data recovery.

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**6.2.3.3 Escrow of Subscriber Private Signature Keys**

Subscriber private signature keys **must not** be escrowed.

**6.2.3.4 Escrow of Subscriber Private Encryption and Dual Use Keys**

Subscriber private dual use keys **must not** be escrowed.

If a device/application has a separate key management key certificate, the key management private key may be escrowed. Subordinate CAs may escrow any encryption keys whose certificates do not also contain the *digitalSignature* key usage bit for the purpose of data recovery as described in Section 4.12.1.

Keys in escrow **must** be protected using cryptography validated to the same FIPS 140 level as the CA. Recovery of keys in escrow **must** be protected using the same level of strength of technical controls present at the time of initial issuance, which are described in Section 6.1.2.

**6.2.4 Private Key Backup****6.2.4.1 Backup of DOS Root CA and Subordinate CA Private Signature Keys**

The DOS OPKI AD Root CA **must** back up its private signature key under multi-person control, as specified in Section 5.2.2.

Backup of subordinate CA private signature keys is **required** to facilitate disaster recovery. Where required by Section 5.2.2, subordinate CAs **must** back up private signature keys under multi-person control.

The CMA **must** create backups of the DOS OPKI CA private signature keys on separate cryptographic modules. The CMA **must** create these keys under the same multi-person control as the original signature key. Such backups **must** create only a single copy of the AD Root CA and subordinate CA signature key at the primary CA location. The CMA **must** store at least one copy of the DOS OPKI AD Root CA's and each subordinate CA's private signature key at the off-site backup location. The CMA **must** account for and protect all copies of CA private signature keys in the same manner as the original.

All backup copies of CA private signature keys **must** reside solely on cryptographic modules of equal strength and validation level as the primary. These levels are detailed in Section 6.2.1.

**6.2.4.2 Backup of Subscriber Private Signature Key**

The backup, copying or escrow of a Subscriber private signature key, to include role, group, and device/application, is **prohibited**.

**6.2.4.3 Backup of Subscriber Key Management Private Keys**

Subordinate CAs may backup Subscriber key management private keys.

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Subordinate CAs **must** encrypt backed up Subscriber key management private keys using an algorithm of a strength consistent with the private key being stored; or stored in a cryptographic module validated at FIPS 140 Level 2.

**6.2.4.4 Backup of CSS Private Key**

DOS CMAs may backup CSS private keys. If backed up, the CMA **must** account for and protect all copies in the same manner as the original.

**6.2.5 Private Key Archival**

DOS CAs **must not** archive CA or Subscriber private signature keys.

DOS OPKI Subordinate CAs may maintain an archive of escrowed Subscriber private key management keys. Such archives **must** be protected in accordance with Sections 4.12, 5.1, 5.2, and 6.2.1.

**6.2.6 Private Key Transfer into or from a Cryptographic Module**

DOS OPKI CA private keys **must** be generated by and remain within a FIPS 140 validated cryptographic module as required by Section 6.2.1. At no time **must** the CA private key exist in plain text outside the cryptographic module.

CA, and CSS private signature keys may be exported from the cryptographic module only to perform CA key backup procedures as described in Section 6.2.4.

Subscriber private keys **must** be generated by and remain within a cryptographic module. If escrowed, a copy of the Subscriber's private key management key **must** be securely transported between the KED and the Subscriber's cryptographic module.

In the event that a private key is transported from one cryptographic module to another, to include key recovery operations, the private key **must** be encrypted during transport using a FIPS approved algorithm and at a bit strength commensurate with the key being transported. Private keys **must never** exist in plain text form outside the cryptographic module boundary.

Private or symmetric keys used to encrypt other private keys for transport, must be protected from disclosure. The protection of these keys **must** be commensurate with that provided the data protected by the certificate associated with the private key.

**6.2.7 Private Key Storage on Cryptographic Module**

This CP makes no further stipulation beyond that specified in [FIPS 140].

**6.2.8 Method of Activating Private Keys**

For the DOS OPKI CAs that operate at the Medium, Medium Hardware, or High level of assurance, CA signing key activation **requires** multiparty control as specified in Section 5.2.2.

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Subscribers **must** use passphrases, PINS, biometric data, or other mechanisms of equivalent authentication robustness to authenticate to the cryptographic module before activating any private key in the cryptographic module for certificates at all levels of assurance. Section 6.4.1 specifies activation data generation requirements. The CMA **must** distribute activation data in person, or by an accountable method to the Subscribers separately from the cryptographic modules that they activate. Subscribers **must** protect the entry of activation data from disclosure using protections described in Section 6.4.2.

For certificates issued under the *mediumDevice* and *mediumDeviceHardware* policy OIDs, the device may be configured to activate its private key without requiring the PKI Sponsor to authenticate to the cryptographic module, **provided** that appropriate physical and logical access controls are implemented for the device and its cryptographic token. The strength of the security controls **must** be commensurate with the level of threat in the device's environment; and **must** protect the device's hardware, software, and the cryptographic module and its activation data from compromise.

**6.2.9 Methods of Deactivating Private Keys**

If a DOS OPKI CA's private signing key is located on a removable cryptographic module, the CMA **must** remove cryptographic module and store it in a secure container when not in use, as specified in Section 5.1.2.

Subscribers **must not** leave activated cryptographic modules unattended or otherwise open to unauthorized access. When not in active use, they **must** be deactivated, e.g. via a manual logout procedure, by removing the cryptographic module, or automatically after a period of inactivity as defined in the applicable CA CPS. Subscribers should remove and secure (e.g., under their personal control or in an approved security container) cryptographic modules when not in use.

**6.2.10 Method of Destroying Private Keys**

Destroying private keys in software cryptographic modules can be accomplished by overwriting the data using a DS-approved utility and procedures. For hardware cryptographic modules, this will likely be accomplished by executing a "zeroize" command. Private key destruction should not require physical destruction of hardware.

Individuals in trusted roles **must** destroy CA, RA, and CSS private signature keys when no longer needed.

The DOS OPKI AD Root and subordinate CAs **must** document their key destruction procedures and generate auditable evidence that the documented procedures were followed. For all levels of assurance, the documentation of the procedures **must** provide enough detail to show the use of appropriate role separation.

Cryptographic modules containing the DOS OPKI AD Root or subordinate CA keys **must** be physically destroyed if the cryptographic module cannot be zeroized or if the cryptographic module will no longer be physically secured within a DOS OPKI production environment.

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For High, Medium Hardware, and Medium Assurance, a person appointed to the PKI Auditor trusted role **must** validate the execution of the key destruction procedures by witnessing the key destruction.

Subscriber private signature keys **must** be destroyed when no longer needed, or when the certificates to which they correspond expire or are revoked. Individual Subscribers **must** take hardware tokens to an LRA, RA, or the CMA for zeroizing.

PKI Sponsors **must** request the assistance of a LRA, RA, or the CMA with the overwriting of software cryptographic modules used by hardware components and applications.

**6.2.11 Cryptographic Module Rating**

See Section 6.2.1

**6.3 OTHER ASPECTS OF KEY MANAGEMENT**

Human Subscribers **must** typically have one key-pair for digital signature, and a separate key-pair for encryption. A single dual-use (digital signature and encryption) key pair is **prohibited** for Medium Hardware and High Assurance implementations but may be issued on a case-by-case basis for Rudimentary, Basic and Medium Assurance levels. Such dual-use key pairs **must** be issued only in support of legacy applications as defined in Section 6.1.7.

A Subscriber's digital signature key-pair **must never** be escrowed, archived, or backed-up, to maintain technical non-repudiation of Subscriber's signatures.

For business continuity reasons, the CA may escrow, archive, or back-up encryption key-pairs.

**6.3.1 Public Key Archival**

Public key archival **must** be in accordance with Section 5.5.

**6.3.2 Certificate Operational Periods and Key Usage Periods**

DOS OPKI CAs **must not** issue Subscriber certificates with validity periods that extend beyond the expiration date of their own certificate and public key. Each DOS OPKI CA certificate validity period **must** extend one user certificate validity period past the last use of the CA private key.

The validity period of a subscriber certificate **must not** exceed the routine re-key Identity Requirements as specified in Section 3.3.1.

RA, KRA, and KRO key usage periods are as described for Subscribers.

A CA private key may be used to sign CRLs and OCSP responder certificates for the entire usage period of the CA's public key. All certificates signed by a specific CA private key **must** expire before the end of the usage period for that specific CA's public key. DOS CAs may use their signature key to sign certificates until the end of their private key's usage period.

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Thereafter, their signing key may only be used to sign CRLs and OCSP Responder certificates until the last Subscriber certificate signed using that key has expired.

All restrictions on private key usage periods **must** be enforced procedurally or technically.

Table 6-4 specifies the maximum private key usage period and public key usage period **requirements** (certificate validity period) for the types of certificates issued by the DOS OPKI's AD Root CA, and Subordinate CAs.

**Table 6-4 Maximum Key Usage Periods for DOS OPKI CA, CSS and Subscriber Certificates**

| CA and Subscriber Certificate Type         | Private Key Usage Period | Public Key Usage Period<br>(Certificate Validity Period) |
|--------------------------------------------|--------------------------|----------------------------------------------------------|
| <b>AD ROOT CA</b>                          |                          |                                                          |
| Self-Signed Certificate                    | 20 years                 | 20 years                                                 |
| Subordinate CA Certificates                |                          |                                                          |
| AD HACA Certificate                        | 10 years                 | 10 years                                                 |
| PIV CA2 Certificate                        | 10 years                 | 10 years                                                 |
| PIV CA3 Certificate                        | 10 years                 | 10 years                                                 |
| DPC CA Certificate**                       | 10 years                 | 10 years                                                 |
| OCSP Responder Certificate                 | 3 years                  | 120 days                                                 |
| <b>AD HACA (Subordinate CA)</b>            |                          |                                                          |
| Basic Assurance Authentication Certificate | 3 years                  | 3 years                                                  |
| Administrator Authentication Certificate   | 3 years                  | 3 years                                                  |
| Strong Authentication Certificate          | 3 years                  | 3 years                                                  |
| SNAP Digital Signature Certificate*        | 3 years                  | 3 years                                                  |
| SNAP Key Management Key Certificate        | Unrestricted             | 3 years                                                  |

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**Table 6-4 Maximum Key Usage Periods for DOS OPKI CA, CSS and Subscriber Certificates**

| <b>CA and Subscriber Certificate Type</b>      | <b>Private Key Usage Period</b> | <b>Public Key Usage Period<br/>(Certificate Validity Period)</b> |
|------------------------------------------------|---------------------------------|------------------------------------------------------------------|
| Code Signing Certificate                       | 3 years                         | 3 years                                                          |
| Role Holder Digital Signature Certificate*     | 3 years                         | 3 years                                                          |
| Role Delegated Digital Signature Certificate   | 3 years                         | 3 years                                                          |
| Role-based Key Management Key Certificate      | Unrestricted                    | 3 years                                                          |
| Group Digital Signature Certificate*           | 3 years                         | 3 years                                                          |
| Group Key Management Key Certificate           | Unrestricted                    | 3 years                                                          |
| OCSP Responder Certificate                     | 3 years                         | 120 days                                                         |
| Device Certificate                             | 3 years                         | 3 years                                                          |
| Wildcard Certificate                           | 1 year                          | 1 year                                                           |
| <b>PIV CA2 &amp; PIV CA3 (Subordinate CAs)</b> |                                 |                                                                  |
| FLAC Authentication Certificate                | 3 years                         | 3 years                                                          |
| FLAC Card Authentication Certificate           | 3 years                         | 3 years                                                          |
| FLAC Digital Signature Certificate*            | 3 years                         | 3 years                                                          |
| FLAC Key Management Key Certificate            | Unrestricted                    | 3 years                                                          |
| OCSP Responder Certificate                     | 3 years                         | 120 days                                                         |
| <b>DPC CA (Subordinate CA)**</b>               |                                 |                                                                  |

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**Table 6-4 Maximum Key Usage Periods for DOS OPKI CA, CSS and Subscriber Certificates**

| CA and Subscriber Certificate Type           | Private Key Usage Period | Public Key Usage Period<br>(Certificate Validity Period) |
|----------------------------------------------|--------------------------|----------------------------------------------------------|
| Derived FLAC Card Authentication Certificate | 3 years                  | 3 years                                                  |
| OCSP Responder Certificate                   | 3 years                  | 120 days                                                 |

\* Signatures generated with subscriber signature certificates may be validated after expiration of the certificate.

\*\* The DPC CA can issues both Derived PIV Authentication Certificates and Derived FLAC Authentication Certificates. Since Derived PIV Authentication Certificates are governed by the FCPF CP, they are not included in Table 6-4.

### 6.3.3 Destruction of Sensitive Keys and Cryptographic Materials

CA Signing keys, and Code Signing Keys **must** be destroyed when they are no longer needed.

Sensitive keys may be destroyed by zeroization of the cryptographic module containing them **only** when the cryptographic module will remain under the control of the DOS OPKI and be re-used to generate and host a new production sensitive key.

In all other cases, such as disposing of the cryptographic module or returning the cryptographic module to its manufacturer for any reason, the cryptographic module containing the sensitive key **must** be physically destroyed using a Disintegrator authorized by the DOS for use in destroying PCI Cards.

The destruction of a sensitive key **must** be authorized in writing by the DOS PKI PMA and **must** be performed by an individual appointed to the PKI Administrator Trusted role, witnessed by an individual appointed to the PKI Auditor Trusted Role and documented using the DOS PKI Record of Destruction of Sensitive Keys Form (DOS PKI DSK Form).

## 6.4 ACTIVATION DATA

### 6.4.1 Activation Data Generation and Installation

The activation data used to unlock DOS OPKI AD Root CA, subordinate CA or Subscriber private keys, in conjunction with any other access control, **must** have an appropriate level of strength for the keys or data protected. Where the DOS OPKI AD Root CA or a subordinate CA uses passphrases as activation data for the CA signing key, at a minimum the CMA **must** change

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the activation data upon CA re-key or upon appointment of new administrator or operator trusted roles.

For Medium Assurance and above, for RAs and Subscribers the activation data may be user selected. The strength of the activation data **must** meet or exceed the requirements for authentication mechanisms stipulated for Level 2 in [FIPS 140]. See Section 6.2.1. The activation data used to unlock private keys **must** have an appropriate level of strength for the keys or data protected. Passphrases, PINS, biometric data, or other mechanisms of equivalent authentication robustness **must** be used to protect access to a private key<sup>13</sup>. When passphrases are used, they **must** be a minimum of twelve (12) characters. When PINs are used, they **must** be a minimum of six (6) characters.

For highAssurance credentials, in the event activation data can be reset by an issuer after a card is locked, authentication of the subscriber is required. This authentication must be conducted in accordance with FIPS 201, Section 2.9.3.

**6.4.2 Activation Data Protection**

Data used to unlock private keys **must** be protected from disclosure by a combination of cryptographic and physical access control mechanisms. Activation data **must** be:

- Memorized,
- Biometric in nature,
- Contained within an organizationally approved device or software tool (e.g., password manager) that leverages encryption commensurate with the bit-strength of the key it activates, or
- Physically recorded and secured at the level of assurance associated with the activation of the cryptographic module and stored separately from the cryptographic module.

For FIPS 140 Level 2 and higher modules, the protection mechanism **shall** include an ability to temporarily lock the account, or terminate the application, after a predetermined number of failed login attempts to protect against repeated guessing attacks, as set forth in the respective CPS.

Subscribers **must never** share activation data for private keys associated with certificates asserting individual identities. PKI Sponsors **must** restrict activation data for private keys associated with certificates asserting group, organizational, non-human component identities to those in the organization authorized to use the private keys.

If transmission of the activation data must occur, it **must** be via a channel with appropriate protection, and distinct in time and place from the associated cryptographic module. As part of the delivery method, users **must** sign and return a delivery receipt. In addition, users will also receive (and acknowledge) a user advisory statement to help them understand their responsibilities for use and control of the cryptographic module.

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<sup>13</sup> For certificates issued at the Card Authentication level of assurance, Subscriber authentication is not required to use the associated private key.

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When operating at a Medium Hardware or High assurance level, RAs **must** change their cryptographic module activation data passphrase at least every six months (180 days)<sup>14</sup>.

**6.5 COMPUTER SECURITY CONTROLS****6.5.1 Specific Computer Security Technical Requirements**

For all DOS OPKI CAs, and KEDs, the computer security functions listed below are **required**. These functions may be provided by the operating system, or through a combination of operating system, software, and physical safeguards. CAs and ancillary parts **must** include the following functionality (these functions pertain to all system software layers, where applicable):

- Authenticate the identity of users before permitting access to the system or applications,
- Manage privileges of users to limit users to their assigned roles,
- Generate and archive audit records for all transactions, (see Section 5.4)
- Enforce domain integrity boundaries for security critical processes,
- Require use of cryptography for session communication and database security,
- Require self-test security-related CA services,
- Require a trusted path for identification of all users,
- Provide residual information protection, and
- Require recovery from key or system failure.

For CSS, the computer security functions listed below are **required** (these functions pertain to all system software layers, where applicable):

- Authenticate the identity of users before permitting access to the system or applications,
- Manage privileges of users to limit users to their assigned roles,
- Enforce domain integrity boundaries for security critical processes,
- Provide residual information protection, and
- Require recovery from key or system failure.

For remote workstations used to administer the CAs, and KEDs, the computer security functions listed below are also **required**:

- Authenticate the identity of users before permitting access to the system or applications,
- Manage privileges of users to limit users to their assigned roles,
- Generate and archive audit records for all transactions, (see Section 5.4)

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<sup>14</sup> Department of State internal rules regarding changing of “passwords” and “passphrases” differ; the DOS OPKI (including PIV CA2 and the DPC CA) use passphrases and adhere to that Departmental standard.

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- Enforce domain integrity boundaries for security critical processes,
- Provide residual information protection, and
- Require recovery from system failure.

All workstations that are part of the PKI infrastructure **must** be configured to lock when the smart card or YubiKey token used to authenticate the user is removed from its interface to the workstation.

All communications between any PKI trusted role and any CA **must** be authenticated and protected from modification.

**6.5.2 Computer Security Rating**

When evaluated platforms host CA equipment in support of computer security assurance requirements, then the system (hardware, software, and operating system) **must** operate only in an evaluated and certified configuration, per the Department of State Office of Information Assurance. At a minimum, such platforms **must** use the same version of the computer operating system as received the evaluation rating.

**6.6 LIFE-CYCLE SECURITY TECHNICAL CONTROLS****6.6.1 System Development Controls**

The System Development Controls for the DOS OPKI CAs (including any remote workstations used to administer the CA) and RAs at the Basic Assurance level and above are as follows:

- Where open-source software has been utilized, the applicant **must** demonstrate that security requirements were achieved through software verification and validation and structured development/life-cycle management.
- Hardware and software used to administer or operate the CA **must** be procured and shipped in a fashion to reduce the likelihood that any component was tampered with (e.g., by ensuring the equipment was randomly selected at time of purchase).
- Custom hardware and software **must** be developed in a controlled environment, and the development process **must** be defined and documented. This requirement does not apply to commercial off-the-shelf hardware or software.
- The CA hardware and software, including all system software layers, **must** be dedicated to operating and supporting the CA (i.e., the systems and services dedicated to the issuance and management of certificates). There **must** be no other applications, hardware devices, network connections, or component software installed which are not part of the CA operation, administration, monitoring and security compliance of the system. CA hardware and system software layers may support multiple CAs and their supporting systems, provided all systems have comparable security controls and are dedicated to the support of the CA in compliance with the same CP.
- Proper care **must** be taken to prevent malicious software from being loaded onto the CA equipment. All applications required to perform the operation of the CA **must** be

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obtained from documented sources. Except for Offline CAs, CA and RA hardware and software **must** be scanned for malicious code on first use and periodically thereafter.

- Hardware and software updates **must** be purchased or developed in the same manner as original equipment and **must** be installed by trusted and trained personnel in a defined manner.

**6.6.2 Security Management Controls**

The configuration of the CA system as well as any modifications and upgrades **must** be documented and controlled. There **must** be a mechanism for detecting unauthorized modification to CA software or configuration. The CA software, when first loaded, **must** be verified as being that supplied from the vendor, with no modifications, and be the version intended for use. The CA **must** periodically verify the integrity of the software.

**6.6.3 Life Cycle Security Controls**

This CP makes no stipulation.

**6.7 NETWORK SECURITY CONTROLS**

This section does not apply to offline CAs.

A network guard, firewall, or filtering router **must** protect network access to CA and KRS equipment. The network guard, firewall, or filtering router **must** limit services allowed to and from the CA and KRS equipment to those required to perform CA and KRS functions.

Protection of CA and KRS equipment **must** be provided against known network attacks. All unused network ports and services **must** be turned off. Any network software present on the CA and KRS equipment **must** be necessary to the functioning of the CA application.

Any boundary control devices used to protect the local area network on which PKI equipment is hosted **must** deny all but the necessary services to the PKI equipment.

RAs, CMSs, repositories, CSSs, and remote workstations used to administer the CAs **must** employ appropriate network security controls. Networking equipment **must** turn off unused network ports and services. Any network software present **must** be necessary to the function of the equipment.

Any remote workstation used to administer the CA **must** be configured for mutual authentication. The remote workstation to CA communications, to include CA boundary control devices, **must** incorporate data integrity and confidentiality services. The remote workstation to CA network communications **must** be encrypted and **must not** be vulnerable to replay or machine-in-the-middle attacks. If mutual authentication is shared secret based, the shared secret **must** be changed at least annually, **must** be randomly generated, and **must** have entropy commensurate with the cryptographic strength of certificates issued by the PKI being administered.

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Once the connection is established between the remote workstation and the CA or boundary control devices, the CA **must** permit remote administration only after successful multi-factor authentication of the Trusted Role at a level of assurance commensurate with that of the CA.

**6.8 TIME STAMPING**

Asserted times **must** be accurate to within three minutes. Electronic or manual procedures may be used to maintain system time. Clock adjustments are auditable events, see Section 5.4.1.

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## 7. CERTIFICATE, CARL/CRL, AND OCSP PROFILES

### 7.1 CERTIFICATE PROFILE

Certificates issued by DOS OPKI CAs under this policy **must** conform to the current version of the Federal Public Key Infrastructure (PKI) X.509 Certificate and CRL Extensions Profile [FBCA-PROF].

#### 7.1.1 Version Numbers

Certificates **must** be of type X.509 v3 (populate version field with integer "2").

#### 7.1.2 Certificate Extensions

Certificates issued by DOS OPKI CAs under this policy use standard certificate extensions that **must** comply with [RFC 5280].

Certificates issued by DOS OPKI CAs under this policy **must** comply with the current version of [FBCA-PROF].

DOS OPKI CA certificates **must not** include critical private extensions.

Subscriber certificates issued by subordinate CAs may include critical private extensions so long as interoperability within the community of use is not impaired.

DOS OPKI CA and Subscriber certificates may include any extensions as specified by [RFC 5280] in a certificate, but **must** include those extensions required by this CP. Any optional or additional extensions **must not** conflict with the applicable certificate and CRL profiles identified in Section 7.1

#### 7.1.3 Algorithm Object Identifiers

Certificates issued by DOS OPKI CAs under this policy **must** identify the signature algorithm using one of the following OIDs:

**Table 7-1 Object Identifiers for Signature Algorithms**

| Signature Algorithm     | Object Identifier                                                                             |
|-------------------------|-----------------------------------------------------------------------------------------------|
| sha256WithRSAEncryption | { iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-1(1) 11 } (1.2.840.113549.1.1.11) |
| sha384WithRSAEncryption | { iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-1(1) 12 } (1.2.840.113549.1.1.12) |
| sha512WithRSAEncryption | { iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-1(1) 13 } (1.2.840.113549.1.1.13) |

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| Signature Algorithm | Object Identifier                                                                                             |
|---------------------|---------------------------------------------------------------------------------------------------------------|
| id-RSASSA-PSS       | { iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-1(1) 10 } (1.2.840.113549.1.1.10)                 |
| ecdsa-with-SHA256   | { iso(1) member-body(2) us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2 (3) 2 } (1.2.840.10045.4.3.2) |
| ecdsa-with-SHA384   | { iso(1) member-body(2) us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 3 } (1.2.840.10045.4.3.3)  |
| ecdsa-with-SHA512   | { iso(1) member-body(2) us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 4 } (1.2.840.10045.4.3.4)  |

The PSS padding scheme OID is independent of the hash algorithm. The hash algorithm is specified as a parameter (for details, see [PKCS#1]). The following are the approved hash algorithms:

**Table 7-2 Object Identifiers for Hash Algorithms for RSA With PSS Padding**

| Hash Algorithm | Object Identifier                                                                                                                   |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------|
| id-sha256      | { joint-iso-itu-t(2) country(16) us(840) organization(1) gov(101) csor(3) nistalgorithm(4) hashalgs(2) 1 } (2.16.840.1.101.3.4.2.1) |
| id-sha384      | { joint-iso-itu-t(2) country(16) us(840) organization(1) gov(101) csor(3) nistalgorithm(4) hashalgs(2) 2 } (2.16.840.1.101.3.4.2.2) |
| id-sha512      | { joint-iso-itu-t(2) country(16) us(840) organization(1) gov(101) csor(3) nistalgorithm(4) hashalgs(2) 3 } (2.16.840.1.101.3.4.2.3) |

Certificates **must** use the following OIDs to identify the algorithm associated with the subject key:

**Table 7-3 Object Identifiers for Public Key Algorithms**

| Public Key Algorithm | Object Identifier                                                                           |
|----------------------|---------------------------------------------------------------------------------------------|
| rsaEncryption        | { iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-1(1) 1 } (1.2.840.113549.1.1.1) |

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|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| id-ecPublicKey | { iso(1) member-body(2) us(840) ansi-X9-62(10045) id-publicKeyType(2) 1 } (1.2.840.10045.2.1) |
|----------------|-----------------------------------------------------------------------------------------------|

Where non-CA certificates contain an elliptic curve public key, the parameters **must** be specified as one of the following named curves:

**Table 7-4 Object Identifiers for Elliptic Curve**

| Curve      | Object Identifier                                                                     |
|------------|---------------------------------------------------------------------------------------|
| ansip256r1 | { iso(1) member-body(2) us(840) 10045 curves(3) prime(1) 7 }<br>(1.2.840.10045.3.1.7) |
| ansip384r1 | { iso(1) identified-organization(3) certicom(132) curve(0) 34 }<br>(1.3.132.0.34)     |

#### 7.1.4 Name Forms

In general, the DOS OPKI will use the X.500 Distinguished Name (DN) in subject and issuer fields of the base certificate throughout the Department of State. Distinguished names **must** be composed of standard attribute types, such as those identified in [RFC 5280].

The DOS OPKI will use HTTP/LDAP-compliant name forms consistent with best practices for AD implementations as defined by the DOS IT-CCB and DT Enterprise Network Management (DT/ENM). The applicable CPS **must** define the use of alternate name forms, when permitted within the system including types, and name constraints.

#### 7.1.5 Name Constraints

Medium, Medium Hardware, and High assurance CA certificates issued by the DOS OPKI **must** impose name constraints and path length constraints as required by [FBCA-PROF].

#### 7.1.6 Certificate Policy Object Identifiers

All certificates issued by the DOS OPKI **must** include a certificate policies extension asserting one or more of the certificate policy OIDs defined by this CP appropriate to the level of assurance with which it was issued. See Section 1.2 for the certificate policies and their associated OIDs that may be asserted under this CP, and to identify the assurance level of each certificate policy.

Delegated OCSP Responder certificates **must** assert all policy OIDs for which they are authoritative.

#### 7.1.7 Usage of Policy Constraints Extension

The CAs may assert policy constraints in CA certificates. When this extension appears, at least one of *requireExplicitPolicy* or *inhibitPolicyMapping* **must** be present. When present, this

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extension may be marked critical. For Subordinate CA certificates *inhibitPolicyMappings*, skip certs **must** be set to 0. For cross-certificates *inhibitPolicyMappings*, skip certs will be set as appropriate. When *requireExplicitPolicy* is included skip certs **must** be set to 0.

**7.1.8 Policy Qualifiers Syntax and Semantics**

Certificates issued under this policy may contain policy qualifiers identified in [RFC 5280]. Processing semantics for any critical certificate policy extensions issued to Subscribers **must** conform to [FBCA-PROF].

**7.1.9 Processing Semantics for the Critical Certificate Policy Extension**

Processing semantics for any critical certificate policy extensions issued to Subscribers **must** conform to [FBCA-PROF].

**7.1.10 Inhibit Any Policy Extension**

DOS OPKI CAs may assert *InhibitAnyPolicy* in CA certificates. When present, this extension may be marked critical. Skip Certs **must** be set to 0.

To support legacy applications that cannot process *InhibitAnyPolicy*, this extension should be marked noncritical, and Skip Certs set to 0.

**7.2 CRL PROFILE****7.2.1 Version Numbers**

DOS OPKI CAs **must** issue X.509 version two (2) CRLs.

**7.2.2 CRL and CRL Entry Extensions**

DOS OPKI CAs **must** conform to the CRL profiles addressing the use of each extension as specified in [FBCA-PROF].

**7.3 OCSP PROFILE**

CSSs operating under this policy **must** sign responses using algorithms designated for CRL signing.

The CSS **must** accept and return SHA-1 hashes when included in the *CertID* and *responderID* fields. The CSS **must not** return any response containing a hash algorithm in the *CertID* that differs from the *CertID* in the request.

**7.3.1 Version Numbers**

CSSs operating under this policy **must** use OCSP version 1.

**UNCLASSIFIED****7.3.2 OCSP Extensions**

CSSs operating under this policy **must not** use critical OCSP extensions.

**7.4 DOS OPKI CERTIFICATE AND CRL CONTENT SPECIFICATIONS**

The DOS PKIPO **must** create and maintain a DOS OpenNet PKI Certificate and CRL Content Specifications document which contains a Worksheet for each type of certificate and CRL issued by DOS OPKI CAs.

The Worksheets **shall** be in the format used by the FPKIPA Certificate & CRL Profiles documents with the following difference. While the Worksheets in the FPKIPA Certificate & CRL Profiles documents identify multiple acceptable options for entries in some certificate fields or extensions (e.g., the Signature Algorithm, Signature Public Key, and Extended Key Usage fields), the Worksheets in the DOS OpenNet PKI Certificate and CRL Content Specifications document **must** identify the specific entry options used in that certificate-type issued by the DOS OPKI CA.

The DOS OpenNet PKI Certificate & CRL Content Specifications document and updates to the document must be reviewed by the DOS PKI Engineering and Policy Subject Matter Experts (SMEs) and approved by the DOS PKI OA. All production certificates and CRLs issued by DOS OPKI CAs must conform to the Worksheets in the DOS OpenNet PKI Certificate & CRL Content Specifications document.

**8. COMPLIANCE AUDIT AND OTHER ASSESSMENTS**

The DOS OPKI and its CAs are subject to an annual review by the FPKIPA to ensure their policies and operations remain consistent with the policy mappings in the cross-certificate issued to the AD Root CA by the FCPCA.

The DOS PKI PMA **must** have a compliance audit mechanism in place to ensure implementation and enforcement of the requirements of this CP and the applicable CPSs for the DOS OPKI CAs. The DOS PKI PMA **must** ensure that annual audits are conducted for all PKI functions regardless of how or by whom the PKI components are managed and operated.

The DOS OPKI **must** have appropriate authority to operate.

This CP does not impose a requirement for any particular assessment methodology.

**8.1 FREQUENCY OF AUDIT OR ASSESSMENTS**

The DOS OPKI **must** be subject to a PKI compliance audit at least once per year for High, Medium Hardware, Medium Assurance, and at least once every two years for Basic Assurance. The audit **must** include all CAs, as well as CSSs, CMSs, RAs, KRAs, and supporting repositories.

Where a status server is specified in certificates issued by a CA, the status server **must** be subject to the same periodic compliance audit requirements as the corresponding CA. For example, if an

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OCSP server is specified in the authority information access extension in certificates issued by a CA, that server **must** be reviewed as part of that CA's compliance audit.

The compliance audit of CAs and RAs and KRAs **must** be carried out in accordance with the requirements as specified in the *Federal Public Key Infrastructure (FPKI) Annual Review Requirements* [AUDIT] document.

There is no audit requirement for CAs and RAs operating at the Rudimentary level of assurance.

The DOS PKI PMA has the right to require periodic and aperiodic compliance audits or inspections of subordinate CA or RA operations to validate that the subordinate entities are operating in accordance with the security practices and procedures described in their respective CPS, regardless of how or by whom the PKI components are managed and operated.

The FPKIPA has the right to require aperiodic compliance audits of the DOS OPKI AD Root CA (and, when needed, DOS OPKI subordinate CAs) that interoperate with the FBCA. The FPKIPA **must** state the reason for any aperiodic compliance audit.

Additionally, the Department of State Office of Information Assurance and/or Bureau of Diplomatic Security Analysis and Certification Division has the right to require periodic and aperiodic inspections of subordinate CMA operations to validate that the subordinate CMAs are operating in accordance with the security practices and procedures described in the applicable CPS and DOS FAM. The Office of Information Assurance and/or Bureau of Diplomatic Security Analysis and Certification Division **must** state the reason for any aperiodic inspection.

**8.2 IDENTITY AND QUALIFICATIONS OF ASSESSORS**

The external independent auditor **must** demonstrate competence in the field of compliance audits. At the time of the audit, the CA external independent auditor **must** be thoroughly familiar with the requirements which the applicable CP imposes on the issuance and management of their certificates. The external independent auditor **must** perform such compliance audits as a regular ongoing business activity.

The external independent auditor **must** be a Certified Information System Auditor (CISA), IT security specialist, and a PKI subject matter specialist who can offer input regarding acceptable risks, mitigation strategies, and industry best practices.

**8.3 ASSESSOR'S RELATIONSHIP TO ASSESSED ENTITY**

Either the external independent auditor **must** be a private firm, that is independent from the DOS OPKI being audited, or it **must** be sufficiently organizationally separated from the DOS OPKI to provide an unbiased, independent evaluation. An example of the latter would be The DOS Inspector General.

To ensure independence and objectivity, the external independent auditor should not have been:

- Employed by the DOS OPKI to participate in the development or operations of the DOS OPKI, for a period of at least 5 years prior to the compliance audit

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- A significant contributor to the development or maintenance of the DOS OPKI CPS(s) that will be used in the compliance audit.

The DOS PKI PMA **must** approve the selection of the external independent auditor.

The FPKIPA may determine whether an external independent auditor meets this requirement.

**8.4 TOPICS COVERED BY ASSESSMENT**

The purpose of an external independent compliance audit of a PKI **must** be to verify that it is operating in accordance with a CPS that meets the requirements of the applicable CP, as well as any MOAs between the PKI and any other PKI. A full compliance audit for the PKI covers all aspects within the scope identified above.

The compliance audit of CAs and RAs and KRAs **must** be carried out in accordance with the requirements as specified in the *Federal Public Key Infrastructure (FPKI) Annual Review Requirements* [AUDIT] document.

Components other than CAs may be audited fully or by using a representative sample. If the external independent auditor uses statistical sampling, all PKI components, PKI component managers and operators **must** be considered in the sample. The samples **must** vary on an annual basis.

**8.5 ACTIONS TAKEN AS A RESULT OF DEFICIENCY**

When the external independent auditor finds one or more discrepancies between how the DOS OPKI is designed or is being operated or maintained, and the requirements of this CP, applicable MOAs, or the applicable CPSs, the following actions **must** be performed:

- The external independent auditor **must** document the discrepancies
- The external independent auditor **must** promptly notify the DOS PKI OA and provide documentation of the discrepancies
- The DOS PKI OA will report the discrepancies and the proposed corrective actions, including their expected time for completion, to the DOS PKI PMA. The DOS PKI PMA **must** make the final determination of acceptability of the corrective actions.
- The DOS PKI OA and DOS PKI PMA **must** determine what further notifications or actions are necessary to meet the requirements of the DOS OPKI CP, its associated CPSs, and any relevant MOA provisions, and then proceed to make such notifications and take such actions without delay.
- The DOS PKI OA **must** ensure that the identified corrective actions are implemented in a timely manner.

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When the FPKIPA receives a report of an audit deficiency from DOS OPKI, depending upon the nature and severity of the discrepancy, and how quickly it can be corrected, the FPKIPA may require additional actions be taken as a condition for continued cross-certification with the FPKI to protect the level of trust in the FPKI infrastructure.

**8.6 COMMUNICATION OF RESULTS**

On an annual basis, the DOS PKI PMA **must** submit an annual review package for the DOS OPKI to the FPKIPA. This package **must** be prepared in accordance with the *Federal Public Key Infrastructure (FPKI) Annual Review Requirements* [AUDIT] document and **must** include an assertion from the DOS PKI PMA that all PKI components have been audited - including any components that may be separately managed and operated. The package **must** identify the versions of the CPs and CPSs used in the assessment. Additionally, where necessary, the results **must** be communicated as set forth in Section 8.5 above.

The DOS PKI OA communicates the audit results to the DOS PKIPO staff and to the Diplomatic Security Service/Office of Security Technology/Security Systems Integrity Division/Identity Management Program (DS/ST/SSI/IDM) and the Diplomatic Security Service/Domestic Operations/Office of Domestic Facilities Protection/ Security Support Division (DS/DO/DFP/SSD) management that implements and administers the Department's One Badge Program. The DOS PKI OA works with them to develop, track progress, and implement corrective actions to address the audit's deficiency findings.

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**9. OTHER BUSINESS AND LEGAL MATTERS****9.1 FEES**

The Department currently funds the DOS OPKI AD Root and subordinate CAs centrally; however, the DOS PKI PMA reserves the right to charge a fee to external Agencies and internal Bureaus and posts in order to operate the DOS OPKI CAs. The CAs will use these fees only to fund operation of the DOS OPKI CAs and fielding of PKI hardware and software beyond normally anticipated requirements (e.g., additional and/or special purpose certificates), based on the recommendation of the DOS PKI OA.

**9.1.1 Certificate Issuance or Renewal Fees**

This CP makes no further stipulation.

**9.1.2 Certificate Access Fees**

This CP makes no further stipulation.

**9.1.3 Revocation or Status Information Access Fee**

This CP makes no further stipulation.

**9.1.4 Fees for Other Services**

This CP makes no further stipulation.

**9.1.5 Refund Policy**

This CP makes no further stipulation.

**9.2 FINANCIAL RESPONSIBILITY**

This CP contains no limits on the use of certificates issued by subordinate CAs under this policy, vis-à-vis the protection of financial transactions or information. Entities (e.g., bureaus, offices, posts, missions, external activities), acting as Relying Parties, **must** determine, within their purview, what financial limits if any they wish to impose for certificates used to consummate a transaction; and **must** implement applications at an appropriate level of assurance to support those limitations. The DOS PKI PMA and other elements within the Information Resource Management Bureau assume no financial responsibility or liability for those decisions.

**9.2.1 Insurance Coverage**

This CP makes no further stipulation.

**9.2.2 Other Assets**

This CP makes no further stipulation.

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This CP makes no further stipulation.

**9.3 CONFIDENTIALITY OF BUSINESS INFORMATION**

DOS OPKI CA information not requiring protection **must** be made publicly available. The MOA between the DOS OPKI and the FPKIPA **must** address access to DOS OPKI CA information by the Federal PKI Policy Authority. The respective organization, bureau, or post **must** determine public access to Department information, in accordance with Department policy and Federal law.

**9.3.1 Scope of Confidential Information**

A certificate **must only** contain relevant information necessary to effect secure transactions with the certificate. For proper administration of the certificates, a CMA may request non-certificate information for use in managing the certificates within an organization (e.g., identifying numbers, business or home addresses and telephone numbers). The CPS **must** explicitly identify any such information.

The CMA **must** handle all information stored locally on the CA equipment and not in the repository as sensitive and restrict access to those with an official need-to-know in order to perform their official duties. The MOA between the DOS OPKI and the FPKIPA will address access to DOS information by the FPKIPA.

**9.3.2 Information Not Within the Scope of Confidential Information**

This CP makes no further stipulation.

**9.3.3 Responsibility to Protect Confidential Information**

A CMA **must not** disclose non-certificate information to any third party unless authorized by this policy, required by U.S. law, U.S. government rule or regulation, or order of a U.S. court of competent jurisdiction. The DOS PKI OA **must** authenticate any request for release of information.

**9.4 PRIVACY OF PERSONAL INFORMATION****9.4.1 Privacy Plan**

A Privacy Impact Assessment (PIA) **must** be conducted by the DOS PKI OA for PKI Systems, and by DS/DSS/DO/DFP for the Identity Management System (IDMS) that supports the issuance of PIV and FLAC Credentials and submitted to the DOS Privacy Office (A/GIS) for approval. If deemed necessary by the DOS Privacy Office, Privacy Plans for the PKI Systems and for the IDMS **must** be developed, approved and implemented.

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**UNCLASSIFIED****9.4.2 Information Treated as Private**

DOS OPKI CAs **must** protect all Subscriber's personally identifying information (PII) from unauthorized disclosure. The DOS OPKI CAs **must** also protect personally identifying information for External Entity personnel collected to support cross-certification and MOA requirements from unauthorized disclosure. The CMA may release records of individual transactions upon request of any Subscriber (i.e., originator or recipient) involved in the transaction, or their legally recognized agents. The CMA **must not** release the contents of archives maintained by CAs operating under this policy except as required by law.

The collection of PII **must** be limited to the minimum necessary to validate the identity of the subscriber. This may include attributes that correlate identity evidence to authoritative sources. The RA/LRA **must** provide explicit notice to the subscriber regarding the purpose for collecting and maintaining a record of the PII necessary for identity proofing and the consequences for not providing the information. PII collected for identity proofing purposes **must not** be used for any other purpose.

**9.4.3 Information Not Deemed Private**

Information included in DOS PKI certificates is not subject to protections outlined in Section 9.4.2.

**9.4.4 Responsibility to Protect Private Information**

All CMAs **must** protect personal information from unauthorized disclosure as mandated by the Privacy Act of 1974, as amended. Sensitive information **must** be stored securely and may be released only in accordance with other stipulations in Section 9.4.

All information collected as part of the identity proofing process **must** be protected to ensure confidentiality and integrity. If PKI activities are terminated, CMAs **must** be responsible for disposing of or destroying sensitive information, including PII, in a secure manner, and maintaining its protection from unauthorized access until destruction.

**9.4.5 Notice and Consent to Use Private Information**

The DOS PKI OA is not required to provide any notice or obtain the consent of the Subscriber or Entity personnel to release private information in accordance with the stipulations of Section 9.4.

**9.4.6 Disclosure Pursuant to Judicial or Administrative Process**

The DOS PKI OA **must not** disclose private information to any third party unless authorized by this policy, required by law, government rule or regulation, or order of a court of competent jurisdiction. Any request for release of information **must** be processed according to 41 CFR 105-60.605.

**9.4.7 Other Information Disclosure Circumstances**

This CP makes no further stipulation.

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**UNCLASSIFIED****9.5 INTELLECTUAL PROPERTY RIGHTS**

The DOS PKI OA will not knowingly violate intellectual property rights held by others. The U.S. Department of State owns any public key certificates and private keys that it issues.

**9.6 REPRESENTATIONS AND WARRANTIES**

The following **obligations** pertain to the Department of State DOS PKI PMA and DOS PKI OA:

- Approve the CPS for each CA that issues certificates under this policy,
- Review periodic compliance audits to ensure that CAs are operating in compliance with their approved CPSs,
- Review namespace control procedures to ensure that distinguished names are uniquely assigned for all certificates issued under this CP,
- Revise this CP to maintain the level of assurance and operational practicality,
- Publicly distribute this CP,
- Coordinate modifications to this CP to ensure continued compliance by CAs operating under approved CPSs,
- Review periodic compliance audits to ensure that RAs and other components operated by the agency are operating in compliance with their approved CPSs, and
- Review namespace control procedures to ensure that distinguished names are uniquely assigned within their agency.

**9.6.1 CA and KED Representations and Warranties*****9.6.1.1 CA Obligations***

CAs operating under this policy **must** warrant that their procedures are implemented in accordance with this CP, and that any certificates issued that assert the policy OIDs identified in this CP were issued in accordance with the stipulations of this policy.

A CA that issues certificates that assert a policy defined in this document **must** conform to the stipulations of this document, including:

- Providing to the DOS PKI PMA and DOS PKI OA a CPS, as well as any subsequent changes, for conformance assessment,
- Maintaining its operations in conformance to the stipulations of the approved CPS,
- Ensuring that registration information is accepted only from approved RAs operating under an approved CPS,
- Including only valid and appropriate information in certificates and maintaining evidence that due diligence was exercised in validating the information contained in the certificates,

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- Revoking the certificates of Subscribers found to have acted in a manner counter to their obligations in accordance with Section 9.6.3, and
- Operating or providing for the services of an on-line repository and informing the repository service provider of their obligations if applicable.

**9.6.1.2 KED Obligations**

A KED that provides escrowed keys to Requestors under this policy **must** conform to the stipulations of this document. In particular, the following stipulations apply:

- The DOS PKI PMA **must** approve the CPS/KRPS prior to key escrow,
- The KED **must** operate in accordance with the stipulations of the CPS/KRPS and this policy,
- The CA/KED **must** automatically notify the subscribers when their private keys have been escrowed during the subscriber registration process (e.g., a dialog box may appear on a subscriber's screen during the certificate request process), and
- The KED **must** monitor KRA and KRO activity for patterns of potentially anomalous activity as indicators of possible problems in the infrastructure, and initiate inquiries or investigations as appropriate.

**9.6.2 PKI Trusted Role and KRO Representations and Warranties**

Individuals appointed PKI Trusted Roles as described in this policy **must** comply with the stipulations of this policy and comply with the applicable CPS(s) approved by the DOS PKI PMA for use with this policy. An individual in a PKI Trusted Role who is found to have acted in a manner inconsistent with these obligations is subject to revocation of PKI Trusted Role responsibilities. Individuals appointed to PKI Trusted Roles as described in this policy **must** conform to the stipulations of this document, including:

- The PKI Trusted Role **must not** perform functions assigned to another Trusted Role unless authorized by the applicable CP and CPS.
- The PKI Trusted Role **must** comply with the applicable security and privacy controls identified in National Institute of Standards and Technology (NIST) Special Publication 800-53 Assessing Security and Privacy Controls in Federal Information Systems and Organizations.
- The PKI Trusted Role **must** complete any additional training required for the Trusted Role held including annual PKI Information System Contingency Plan (ISCP) and Incident Response Training.
- The PKI Trusted Role **must** restrict use of their privileged Trusted Role credentials to authenticating to PKI systems to perform their Trusted Role functions only.
- The PKI Trusted Role **must not** allow anyone else to use their Trusted Role account for any reason.

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- The PKI Trusted Role **must only** use their elevated privileges to perform authorized tasks or mission-related tasks on systems they are authorized to access.
- The PKI Trusted Role **must** ensure that two-person controls required by the applicable CP and CPS are maintained when performing their Trusted Role responsibilities.
- The PKI Trusted Role **must** ensure that the role separation required by the applicable CP and CPS is maintained when performing their Trusted Role responsibilities.
- The PKI Trusted Role **must not** perform actions involving the PKI certification authorities, card management systems, key recovery systems, certificate status systems, repositories or other PKI infrastructure components that are not authorized in the applicable CP and CPS, or in procedures authorized by the DOS PKI OA.
- The PKI Trusted Role **must** protect Subscriber personal information from unauthorized disclosure as mandated by the Privacy Act of 1974, as amended.

**9.6.2.1 RA Obligations**

An RA that performs registration functions as described in this policy **must** comply with the stipulations of this policy and comply with the applicable CPS(s) approved by the DOS PKI PMA for use with this policy. An RA who is found to have acted in a manner inconsistent with these obligations is subject to revocation of RA responsibilities. An RA supporting this policy **must** conform to the stipulations of this document, including:

- Maintaining its operations in conformance to the stipulations of the approved CPS.
- Including only valid and appropriate information in certificate requests and maintaining evidence that due diligence was exercised in validating the information contained in the certificate.
- Ensuring that obligations are imposed on Subscribers in accordance with Section 9.6.3, and that Subscribers are informed of the consequences of not complying with those obligations.

**9.6.2.2 KRA Obligations**

KRAs that submit requests as described in this policy must comply with the stipulations of this policy and the applicable CPS/KRPS. In particular, the following stipulations apply:

- KRAs **must** keep a copy of this policy and the applicable CPS/KRPS,
- KRAs **must** protect subscribers' escrowed keys from unauthorized disclosure, including the encrypted files and associated decryption keys,
- KRAs **must** protect all information associated with key recovery, including the KRA's own key(s), that could be used to recover subscribers' escrowed keys,
- KRAs **must** release Subscribers' escrowed keys only for properly authenticated and authorized requests from Requestor,

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- KRAs may rely upon the KROs for authentication and verification of the identity and authority of the Requestor. However, KRAs **must** also authenticate the identity of the Requestor when the Requestor digital signature is available,
- KRAs **must** authenticate the KROs as described in Section 3.5.2,
- KRAs **must** validate the authorization of the KRO by ensuring that the KRO is an authorized KRO for the Subscriber for whom key recovery has been requested,
- KRAs **must** protect all information regarding all occurrences of key recovery,
- KRAs **must** communicate knowledge of a recovery process only to the KRO and Requestor involved in the key recovery,
- KRAs **must not** communicate any information concerning a key recovery to the Subscriber except when the Subscriber is the Requestor, and
- KRAs **must** monitor KRO activity for patterns of potentially anomalous behavior as indicators of possible problems in the infrastructure, and initiate inquiries or investigations as appropriate.

**9.6.2.3 KRO Obligations**

A KRO initiates a key recovery request for a Requestor. When using the services of a KRO, the Requestor is generally a third party, but this policy does not preclude the Subscriber from seeking the assistance of a KRO to recover the Subscriber's private key.

- The KRO **must** protect Subscribers' recovered keys from compromise.
- After providing the Requestor with the encrypted key, the KRO **must** destroy the copy of the key in his/her system.
- The KRO **must** request the Subscriber's keys only upon receipt of a request from an authorized Requestor.
- The KRO, as an intermediary for the KRA, **must** validate the identity of any Requestor seeking a key recovery.
- When the Requestor is authenticated on the basis of digital signature, the KRO **must** forward the Requestor's digitally signed object to the KRA in a form verifiable by the KRA.
- In the case of persons other than the Subscriber seeking a key recovery, the KRO **must** ensure that the Requestor has the authority to request the Subscriber's private decryption key.
- The KRO, as an intermediary for the KRA, **must** validate the authorization for the request, to include consultation with legal counsel when appropriate.
- The KRO **must** protect all information associated with key recovery, including the KRO's own private key(s), that could be used to obtain the Subscriber's recovered private decryption key(s).
- The KRO **must** protect all information regarding all occurrences of key recovery.

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- The KRO must communicate knowledge of any recovery process only to the Requestor
- The KRO **must** not communicate any information concerning a key recovery to the Subscriber except when the Subscriber is the Requestor.
- The KRO **must** accurately represent himself when requesting key recovery services.
- The KRO **must** keep records of all recovery requests and disposition, including acknowledgement of receipt by the Requestor.

If an Issuing Organization chooses not to implement the KRO role, then these obligations become the responsibility of the KRA in addition to the obligations in Section 9.6.2.2 above.

**9.6.3 Subscriber and Data Decryption Server Representations and Warranties*****9.6.3.1 Subscriber Representations and Warranties***

For Medium, Medium Hardware and High Assurance levels, a Subscriber **must** be required to sign a document containing the requirements the Subscriber **must** meet respecting protection of the private key and use of the certificate before being issued the certificate. For Basic Assurance level, the Subscriber **must** be required to acknowledge his or her obligations respecting protection of the private key and use of the certificate before being issued the certificate. Whenever possible, subscriber acknowledgement documents may be digitally signed.

Subscribers of DOS OPKI CAs at Basic, Medium, and High Assurance Levels **must** agree to and **must** be obligated to perform the following:

- Accurately represent themselves in all communications with the PKI authorities and other Subscribers
- Always protect their private keys, in accordance with this policy, as stipulated in their certificate acceptance agreements and local procedures
- Comply with the requirements of this CP and the appropriate CPS, as well as the applicable requirements of the DOS/FPKIPA MOA, as stipulated in their certificate acceptance agreements
- Promptly notify the CMA that issued their certificates upon suspicion of loss or compromise of their private keys. Such notification **must** be made directly or indirectly through mechanisms consistent with the CA's CPS
- Abide by all the terms, conditions, and restrictions levied on the use of their private keys and certificates
- Use certificates provided by the Department of State PKI only for transactions related to Department of State business.

PKI Sponsors (as described in Sections 3.2.2 and 3.2.3) assume the obligations of Subscribers for the certificates associated with their organizations and hardware components. If the human sponsor for a device is not physically located near the sponsored device, and/or does not have sufficient administrative privileges on the sponsored device to protect the device's private key and ensure that the device's certificate is used only for authorized purposes, the PKI Sponsor

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may delegate these responsibilities to an authorized administrator for the device. The PKI Sponsor **must** document any such delegation in writing; and it **must** be signed by both the PKI Sponsor and the authorized administrator for the device. Delegation does not relieve the PKI Sponsor of his or her accountability for these responsibilities. The PKI Sponsor **must** provide a copy (physical or electronic) of all such delegations to the DOS PKI OA.

#### ***9.6.3.2 Group Encryption and Signature Certificate Sponsor and User Representations and Warranties***

Sponsors of group certificates **must**:

- Assign the subject DN and Subject Alternate Name (SAN) of the group certificate, ensuring they reflect the correct group and do not identify nor imply a single individual,
- Maintain a list of individuals having access to the group certificate and its associated private key,
- Maintain a record of the dates and times individual group members have access to a centrally managed hardware group certificate and its associated private key,
- Maintain a Shared Key Usage Agreement for each group member,
- Coordinate revocation requests or key recovery requests with the CA or RA,
- Provide the group member list and Shared Key Usage Agreements to the CA, RA or an auditor upon request or once the group certificate expires or is revoked.

An individual with access to a shared key corresponding to a group certificate **must**:

- Accurately represent themselves in all communications with the PKI authorities and the group sponsor.
- Protect the shared private key(s) at all times, in accordance with this policy and locally defined processes and procedures.
- Promptly notify the group sponsor, or other designated individual, upon suspicion of loss, compromise, or inappropriate use of the shared private key(s). Such notification must be made directly or indirectly through mechanisms consistent with the CA's CPS.
- Abide by all the terms, conditions, and restrictions levied on the use of the shared private key(s) and certificate(s)

#### ***9.6.3.3 Data Decryption Server Representations and Warranties***

Prior to the beginning of the operation of a DDS, the Issuing Organization **must** formally acknowledge and agree to the obligations described here by signing an appropriate document.

- The DDS **must** protect Subscribers' recovered key(s) from compromise. The DDS **must** use a combination of computer security, cryptographic, network security, physical security, personnel security, and procedural security controls to protect their keys and recovered subscribers' keys.

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- The DDS **must** destroy Subscribers' keys when no longer required (i.e., when the data has been recovered).
- The DDS **must** request the Subscriber's escrowed key(s) only upon receiving a request to decrypt subscriber data from an authenticated authorized Enterprise system (e.g., an e-mail Server)
- The DDS **must** use the Subscriber's recovered keys only to recover Subscriber's data requested from an authenticated authorized Enterprise system

The DDS **must** provide accurate identification and authentication information at the same or higher assurance level as required for issuing new PKI certificates at the assurance level of the key being requested.

**9.6.4 Relying Party Representations and Warranties**

This CP does not specify the steps that a relying party should take to determine whether to rely upon a certificate. The relying party **must** decide, pursuant to its own policies, what steps to take. The DOS OPKI CAs merely provides tools (e.g., certificates, and CRLs) that the relying party may wish to employ in its determination.

**9.6.5 Representations and Warranties of Affiliated Organizations**

Affiliated Organizations **must** authorize the affiliation of subscribers with the organization and **must** inform the Entity CA of any severance of affiliation with any current subscriber.

**9.6.6 Representations and Warranties of Other Participants**

If key escrow and recovery are supported, Third-party key recovery Requestors **must** formally acknowledge and agree to the obligations described here, prior to receiving a recovered key:

- The Third-Party Requestor **must** protect Subscribers' recovered key(s) from compromise,
- The Third-Party Requestor **must** use a combination of computer security, cryptographic, network security, physical security, personnel security, and procedural security controls to protect their keys and recovered Subscribers' keys,
- The Third-Party Requestor **must** destroy or surrender Subscribers' keys when no longer required (i.e., when the data has been recovered),
- The Third-Party Requestor **must** request and use the Subscriber's escrowed key(s) only to recover Subscriber's data they are authorized to access,
- The Third-Party Requestor **must** accurately represent themselves to all entities during any key recovery service,
- When the request is made, the Third-Party Requestor **must** provide accurate identification and authentication information at least to the same level required for issuing new PKI certificates at the level of the key being requested (e.g., the Third-Party Requestor sends a digitally signed request using the credential issued by the Entity PKI at the same or higher assurance level as the key being recovered),

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- The Third-Party Requestor **must** protect information concerning each key recovery operation, and
- Upon receipt of the recovered key(s), the Third-Party Requestor **must** sign an acknowledgement of agreement to follow the law and the subscriber's organization policies relating to protection and release of the recovered key. Such agreement **must** include the following attestations attestation:
  - Third Party Requestor has been accurately represented their identity to all key recovery entities,
  - Third Party Requestor has truthfully described the reason(s) for the key recover request,
  - Third Party Requestor has a legitimate and official need to obtain the requested key(s),
  - Third Party Requestor has received the recovered key(s),
  - Third Party Requestor will use the recovered key only for the stated purpose(s),
  - Third Party Requestor will protect the recovered key form unauthorized access. When no longer required, the Third Party Requestor **must** either destroy the key(s) and inform the organization of destruction per agency requirements, or return any recovered key(s) stored on hardware to the organization, and
  - Third Party Requestor is bound by applicable laws and regulations concerning the protection of the recovered key(s) and any data recovered using the key(s).

**9.7 DISCLAIMERS OF WARRANTIES**

DOS OPKI CAs operating under this policy may not disclaim any responsibilities described herein.

**9.8 LIMITATIONS OF LIABILITY**

The U.S. Government **shall not** be liable to any party, except as determined pursuant to the Federal Tort Claims Act (FTCA), 28 U.S.C. 2671-2680, or as determined through a valid express written contract between the Government and another party.

**9.9 INDEMNITIES**

This CP makes no stipulation.

**9.10 TERM AND TERMINATION****9.10.1 Term**

This CP becomes effective when approved by the DOS PKI PMA. This CP has no specified term.

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Termination of this CP is at the discretion of the DOS PKI PMA.

**9.10.3 Effect of Termination and Survival**

The archive requirements of this CP remain in effect through the end of the archive period for the last certificate issued. This CP and its requirements concerning the organization and operations of the DOS OPKI infrastructure; certificate application, usage, and revocation; physical and technical security controls; audits; and other business and legal matters **must** remain in effect through the expiration date of the last certificate issued and/or cessation of operations and closure of the DOS OPKI.

**9.11 INDIVIDUAL NOTICES AND COMMUNICATIONS WITH PARTICIPANTS**

The DOS PKI PMA **must** establish appropriate procedures for communications with PKIs cross-certified with the DOS OPKI via contracts or memoranda of agreement as applicable.

The DOS PKI PMA **must** communicate to the FPKIPA any planned change to the DOS OPKI infrastructure that has the potential to affect the FPKI operational environment at least two weeks prior to implementation. All new artifacts (CA certificates, CRL DP, AIA and/or SIA URLs, etc.) produced as a result of the change **must** be provided to the FPKIPA within 24 hours following implementation.

**9.12 AMENDMENTS****9.12.1 Procedure for Amendment**

The DOS PKI OA **must** conduct a review of this DOS OPKI CP by the DOS PKIPO at least once every year and identify and recommend corrections, updates, or changes, as appropriate. The DOS PKI PMA **must** review the revised CP and approve or reject it. If approved, a copy of the revised CP, with the changes indicated, **must** be sent to the FPKIPA and any other External Entity Principal CAs cross-certified with the DOS OPKI.

DOS entities may request changes to this CP by sending them in writing to the DOS PKI OA. The request **must** include a description of the change, a change justification, and contact information for the person requesting the change. The DOS PKI OA **must** review the proposed change and reject or tentatively accept it based on the results of a review by the DOS PKIPO. If tentatively accepted, the DOS PKI OA will forward the request to the DOS PKI PMA who **must** review and approve or reject it. If approved, the DOS PKI OA may implement the change immediately without waiting for the next release of the DOS OPKI CP that incorporates the change.

**9.12.2 Notification Mechanism and Period**

The DOS PKI PMA **must** send a copy of this DOS OPKI CP and subsequent revisions of this DOS OPKI CP to CMAs that assert this policy within 5 business days of CP approval. The

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CMAs will notify Subscribers of any approved changes to the Certificate Policy that directly affect them or their PKI-related responsibilities.

The DOS PKI PMA **must** make this CP and any subsequent changes to this CP available within 30 days of approval on the following publicly available web site  
<https://pkaps.pki.state.gov/docs/Statement.html>.

**9.12.3 Circumstances Under Which OID Must be Changed**

The DOS OPKI CAs **must** change certificate OIDs if the DOS PKI PMA or the FPKIPA determines that a change in the CP reduces the level of assurance provided.

**9.13 DISPUTE RESOLUTION PROVISIONS**

Any dispute arising with respect to this policy or certificates issued under this policy **shall** be resolved by the Parties.

The DOS PKI PMA decides any disputes over the interpretation or applicability of the Department of State PKI CP.

**9.14 GOVERNING LAW**

United States Federal law (statute, case law, or regulation) governs the construction, validity, performance, and effect of certificates issued under this CP for all purposes.

Where an inter-governmental dispute occurs, resolution **must** be according to the terms of the applicable MOA.

**9.15 COMPLIANCE WITH APPLICABLE LAW**

The DOS OPKI is **required** to comply with applicable law. See Section 9.14.

**9.16 MISCELLANEOUS PROVISIONS****9.16.1 Entire Agreement**

This CP makes no stipulation.

**9.16.2 Assignment**

This CP makes no stipulation.

**9.16.3 Severability**

If it is determined that one section of this CP is incorrect or invalid, the other sections **must** remain in effect until the CP is updated. Section 9.12 describes the requirements for updating this CP. Responsibilities, requirements, and privileges of this document merge into the newer edition upon release of that newer edition.

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**9.16.4 Enforcement (Attorneys' Fees and Waiver of Rights)**

This CP makes no stipulation.

**9.16.5 Force Majeure**

This CP makes no stipulation.

**9.17 OTHER PROVISIONS**

This CP makes no stipulation.

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## APPENDIX A - REFERENCES

The following documents contain information that is required by reference or that otherwise describes or governs Department of State PKI operation.

Table A-1 References

| Reference             | Title                                                                                                                                                                                                                                     |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12 FAM 600            | Information Security Technology, 2000-06-22<br><a href="#">12 FAM Diplomatic Security</a>                                                                                                                                                 |
| 41 CFR 105-60         | Title 41 Code of Federal Regulations Chapter 105-60 Public Availability of Agency Records and Informational Materials                                                                                                                     |
| 5 FAM 400             | Records Management<br><a href="#">5 FAM Information Management</a>                                                                                                                                                                        |
| ABADSG                | Digital Signature Guidelines, 1996-08-01<br><a href="http://itlaw.wikia.com/wiki/American_Bar_Association_(ABA)_Digital_Signature_Guidelines">http://itlaw.wikia.com/wiki/American_Bar_Association_(ABA)_Digital_Signature_Guidelines</a> |
| APL                   | Approved Products List (APL)<br><a href="#">FIPS 201 Approved Product List - IDManagement</a>                                                                                                                                             |
| AUDIT                 | FPI Annual Review Requirements<br><a href="https://www.idmanagement.gov/docs/fpki-annual-review-requirements.pdf">https://www.idmanagement.gov/docs/fpki-annual-review-requirements.pdf</a>                                               |
| CCP-PROF              | Common Policy X.509 Certificate and Certificate Revocation List (CRL) Profiles<br><a href="https://www.idmanagement.gov/docs/fpki-x509-cert-profile-common.pdf">https://www.idmanagement.gov/docs/fpki-x509-cert-profile-common.pdf</a>   |
| DOS PKI DSK Form      | DOS PKI Record of Destruction of Sensitive Keys Form                                                                                                                                                                                      |
| DOS PKI TRAR Form     | DOS PKI Trusted Role Acknowledgement of Responsibility Form                                                                                                                                                                               |
| DS PCI OP             | U.S. Department of State Bureau of Diplomatic Security DOS One Badge PIV Card Issuer (PCI) Operations Plan, v1.25 February 14, 2019                                                                                                       |
| Executive Order 12968 | Executive Order 12968 - Access to Classified Information<br><a href="https://www.govinfo.gov/content/pkg/FR-1995-08-07/pdf/95-19654.pdf">https://www.govinfo.gov/content/pkg/FR-1995-08-07/pdf/95-19654.pdf</a>                           |

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Table A-1 References

| Reference                | Title                                                                                                                                                                                                                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FAM                      | U.S. Department of State Foreign Affairs Manual<br><a href="#">FAM / FAH Table of Contents</a>                                                                                                                                                                                                                                  |
| FBCA CP                  | X.509 Certificate Policy for the Federal Bridge Certification Authority (FBCA)<br>Current version available at <a href="https://www.idmanagement.gov/docs/fpki-x509-cert-policy-common.pdf">https://www.idmanagement.gov/docs/fpki-x509-cert-policy-common.pdf</a>                                                              |
| FBCA-PROF                | Federal Bridge Certification Authority (FBCA) X.509 Certificate and CRL Extensions Profile<br>Current version available at <a href="https://www.idmanagement.gov/docs/fpki-x509-cert-profiles-fbca.pdf">https://www.idmanagement.gov/docs/fpki-x509-cert-profiles-fbca.pdf</a>                                                  |
| FCPF CP                  | X.509 Certificate Policy for the U.S. Federal PKI Common Policy Framework<br>Current version available at <a href="https://www.idmanagement.gov/wp-content/uploads/sites/1171/uploads/fpki-x509-cert-common-policy.pdf">https://www.idmanagement.gov/wp-content/uploads/sites/1171/uploads/fpki-x509-cert-common-policy.pdf</a> |
| FIPS 140-2               | Security Requirements for Cryptographic Modules December 3, 2002.<br><a href="http://csrc.nist.gov/publications/fips/fips140-2/fips1402.pdf">http://csrc.nist.gov/publications/fips/fips140-2/fips1402.pdf</a>                                                                                                                  |
| FIPS 186-4               | Digital Signature Standard, July 19, 2013.<br><a href="https://nvlpubs.nist.gov/nistpubs/FIPS/NIST.FIPS.186-4.pdf">https://nvlpubs.nist.gov/nistpubs/FIPS/NIST.FIPS.186-4.pdf</a>                                                                                                                                               |
| FIPS 201-3               | Personal Identity Verification (PIV) of Federal Employees and Contractors, FIPS 201-3, January 24, 2022.<br><a href="https://csrc.nist.gov/publications/detail/fips/201/3/final">https://csrc.nist.gov/publications/detail/fips/201/3/final</a>                                                                                 |
| FOIACT                   | 5 U.S.C. 552, Freedom of Information Act.<br><a href="#">5 U.S.C. 552 - Public information; agency rules, opinions, orders, records, and proceedings - Content Details - USCODE-2023-title5-partI-chap5-subchapII-sec552</a>                                                                                                    |
| FPKIPA SP 800-53 Overlay | Federal Public Key Infrastructure Policy Authority (FPKIPA) Security Control Overlay of NIST Special Publication 800-53 Revision 5 Security Controls for Federal PKI Systems, Version 3.0, February 26, 2021<br><a href="https://www.idmanagement.gov/docs/">https://www.idmanagement.gov/docs/</a>                             |
| ITMRA                    | 40 U.S.C. 1452, Information Technology Management Reform Act of 1996.<br><a href="https://govinfo.library.unt.edu/npr/library/misc/itref.html">https://govinfo.library.unt.edu/npr/library/misc/itref.html</a>                                                                                                                  |

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Table A-1 References

| Reference   | Title                                                                                                                                                                                                                                                                                                                                                                              |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU-T X.521 | International Telecommunications Union – Telecommunications Standardization Sector (ITU-T) Recommendation X.521 (The Directory: Selected Object Classes), October 14, 2019<br><a href="https://www.itu.int/rec/T-REC-X.521-201910-I">https://www.itu.int/rec/T-REC-X.521-201910-I</a>                                                                                              |
| NS4009      | Committee on National Security Systems Instruction (CNSSI) Glossary, March 2, 2022<br><a href="https://www.cnss.gov/cnss/">https://www.cnss.gov/cnss/</a>                                                                                                                                                                                                                          |
| PA          | 5 U.S.C. 552a Privacy Act, 1974, as amended<br><a href="#">5 U.S.C. 552a - Records maintained on individuals - Content Details - USCODE-2021-title5-partI-chap5-subchapII-sec552a</a>                                                                                                                                                                                              |
| PACS        | <i>Technical Implementation Guidance: Smart Card Enabled Physical Access Control Systems</i> , Version 2.3, The Government Smart Card Interagency Advisory Board's Physical Security Interagency Interoperability Working Group, December 20, 2005.<br><a href="https://www.idmanagement.gov/docs/pacs-tig-scepacs.pdf">https://www.idmanagement.gov/docs/pacs-tig-scepacs.pdf</a> |
| PKCS#1      | Public-Key Cryptography Standards (PKCS) #1: RSA Cryptography Specifications Version 2.1, RFC 3447, February 2003<br><a href="http://www.ietf.org/rfc/rfc3447.txt">http://www.ietf.org/rfc/rfc3447.txt</a>                                                                                                                                                                         |
| PKCS#12     | Public-Key Cryptography Standards (PKCS) #12: Personal Information Exchange Syntax v1.1 July 2014<br><a href="https://tools.ietf.org/html/rfc7292">https://tools.ietf.org/html/rfc7292</a>                                                                                                                                                                                         |
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| RFC 2585    | Internet X.509 Public Key Infrastructure: Operational Protocols: FTP and HTTP, Russel Housley and Paul Hoffman, May 1999<br><a href="https://www.ietf.org/rfc/rfc2585.txt">https://www.ietf.org/rfc/rfc2585.txt</a>                                                                                                                                                                |
| RFC 3647    | Certificate Policy and Certification Practices Framework, Chokhani and Ford, Sabett, Merrill, and Wu, November 2003<br><a href="https://www.ietf.org/rfc/rfc3647.txt">https://www.ietf.org/rfc/rfc3647.txt</a>                                                                                                                                                                     |
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Table A-1 References

| Reference        | Title                                                                                                                                                                                                                                                                                                                            |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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Table A-1 References

| Reference        | Title                                                                                                                                                                                                                                                                      |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| SP 800-76-2      | Biometric Specifications for Personal Identity Verification, NIST Special Publication 800-76-2, July 11, 2013<br><a href="https://csrc.nist.gov/publications/detail/sp/800-76/2/final">https://csrc.nist.gov/publications/detail/sp/800-76/2/final</a>                     |
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| SP 800-157 Rev.1 | Draft Guidelines for Derived Personal Identity Verification (PIV) Credentials, NIST Special Publication 800-157 Rev.1, November 14, 2024<br><a href="https://csrc.nist.gov/pubs/sp/800/157/r1/fpd">https://csrc.nist.gov/pubs/sp/800/157/r1/fpd</a>                        |
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**UNCLASSIFIED****APPENDIX B - ACRONYMS AND ABBREVIATIONS**

The following table provides a key for acronyms and abbreviations that may appear in this Department of State PKI CP.

**Table B-2 Acronyms and Abbreviations**

| <b>Acronym</b> | <b>Expression</b>                              |
|----------------|------------------------------------------------|
| A&A            | Assessment and Authorization                   |
| AD             | Active Directory                               |
| AES            | Advanced Encryption Standard                   |
| AIA            | Authority Information Access                   |
| CA             | Certification Authority                        |
| CIO            | Chief Information Officer                      |
| CISA           | Certified Information System Auditor           |
| CISO           | Chief Information Security Officer             |
| CMA            | Certificate Management Authority               |
| CMS            | Card Management System                         |
| CN             | Common Name                                    |
| CNSS           | Committee on National Security Systems         |
| COMSEC         | Communications Security                        |
| CP             | Certificate Policy                             |
| CPS            | Certification Practice Statement               |
| CRL            | Certificate Revocation List                    |
| CRL DP         | Certificate Revocation List Distribution Point |
| CSA            | Certificate Status Authority                   |
| CSOR           | Computer Security Object Registry              |

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**UNCLASSIFIED****Table B-2 Acronyms and Abbreviations**

| <b>Acronym</b> | <b>Expression</b>                                      |
|----------------|--------------------------------------------------------|
| CSS            | Certificate Status Server                              |
| DDS            | Data Decryption Server                                 |
| DN             | Distinguished Name                                     |
| DNS            | Domain Name System                                     |
| DOS            | U.S. Department of State                               |
| DPC            | Derived PIV Credential                                 |
| DPCI           | Derived PIV Credential Issuer                          |
| DS             | U.S. Department of State Bureau of Diplomatic Security |
| DSA            | Digital Signature Algorithm                            |
| DSS            | Digital Signature Standard                             |
| ECC            | Elliptic Curve Cryptography                            |
| ERC            | Enhanced Reliability Check                             |
| FAM            | Foreign Affairs Manual                                 |
| FAR            | Federal Acquisition Regulations                        |
| FBCA           | Federal Bridge Certification Authority                 |
| FCPCA          | Federal Common Policy Certification Authority          |
| FCPF           | Federal Common Policy Framework                        |
| FED-STD        | Federal Standard                                       |
| FIPS           | Federal Information Processing Standard                |
| FLAC           | Facility Logical Access Card                           |
| FPKIMA         | Federal Public Key Infrastructure Management Authority |
| FPKIPA         | Federal PKI Policy Authority                           |

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**UNCLASSIFIED****Table B-2 Acronyms and Abbreviations**

| <b>Acronym</b> | <b>Expression</b>                                                         |
|----------------|---------------------------------------------------------------------------|
| FTCA           | Federal Tort Claims Act                                                   |
| FTP            | File Transfer Protocol                                                    |
| GPEA           | Government Paperwork Elimination Act of 1998                              |
| GS             | General Schedule (Federal civilian level)                                 |
| GSA            | General Services Administration                                           |
| HACA           | High Assurance Certification Authority                                    |
| HTTP           | Hypertext Transfer Protocol                                               |
| HSM            | Hardware Security Module                                                  |
| IANA           | Internet Assigned Numbers Authority                                       |
| ICRL           | Indirect Certificate Revocation List                                      |
| IDMS           | Identity Management System                                                |
| ISO            | International Organization for Standardization                            |
| ISSO           | Information Systems Security Officer                                      |
| ITU            | International Telecommunications Union                                    |
| ITU-T          | International Telecommunications Union – Telecommunications Sector        |
| ITU-TSS        | International Telecommunications Union – Telecommunications System Sector |
| KED            | Key Escrow Database                                                       |
| KGC            | Key Generation Ceremony                                                   |
| KRA            | Key Recovery Agent or Key Recovery Authority                              |
| KRO            | Key Recovery Officer                                                      |
| KRP            | Key Recovery Policy                                                       |

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**UNCLASSIFIED****Table B-2 Acronyms and Abbreviations**

| <b>Acronym</b> | <b>Expression</b>                                                                 |
|----------------|-----------------------------------------------------------------------------------|
| KRPS           | Key Recovery Practices Statement                                                  |
| KRS            | Key Recovery System                                                               |
| LDAP           | Lightweight Directory Access Protocol                                             |
| LES            | Locally Engaged Staff                                                             |
| LRA            | Local Registration Authority                                                      |
| MOA            | Memorandum of Agreement                                                           |
| MOU            | Memorandum of Understanding                                                       |
| NACI           | National Agency Check with Written Inquiries                                      |
| NACLC          | National Agency Check with Law Enforcement Check                                  |
| NGO            | Non-Governmental Organization                                                     |
| NIST           | National Institute of Standards and Technology                                    |
| NPE            | Non-person Entity                                                                 |
| NSA            | National Security Agency                                                          |
| NSTISSI        | National Security Telecommunications and Information Systems Security Instruction |
| OCSP           | Online Certificate Status Protocol                                                |
| OID            | Object Identifier                                                                 |
| OLT            | Only Locally Trusted                                                              |
| OPKI           | DOS OpenNet PKI                                                                   |
| PCI            | PIV Card Issuer                                                                   |
| PE             | Person Entity                                                                     |
| PII            | Personally Identifiable Information                                               |

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**UNCLASSIFIED****Table B-2 Acronyms and Abbreviations**

| <b>Acronym</b> | <b>Expression</b>                                                                     |
|----------------|---------------------------------------------------------------------------------------|
| PIN            | Personal Identification Number                                                        |
| PIV            | Personal Identity Verification                                                        |
| PIV-I          | Personal Identity Verification – Interoperable                                        |
| PIT            | Part-time/Intermittent/Temporary                                                      |
| PKCS           | Public Key Certificate Standard                                                       |
| PKI            | Public Key Infrastructure                                                             |
| PKIX           | Public Key Infrastructure X.509                                                       |
| PMA            | Policy Management Authority                                                           |
| POC            | Point of Contact                                                                      |
| POA&M          | Plan of Action and Milestones                                                         |
| PSC            | Personal Services Contractor                                                          |
| RA             | Registration Authority                                                                |
| RDN            | Relative Distinguished Name                                                           |
| RFC            | Request For Comments                                                                  |
| RSA            | Rivest-Shamir-Adleman (encryption algorithm)                                          |
| SAN            | Subject Alternate Name                                                                |
| SGID           | State Global Identifier Database                                                      |
| SHA-X          | Secure Hash Algorithm (X: indicates the version number, e.g., Version 1, Version 256) |
| SIA            | Subject Information Access                                                            |
| SME            | Subject Matter Expert                                                                 |
| S/MIME         | Secure Multipurpose Internet Mail Extension                                           |

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Table B-2 Acronyms and Abbreviations

| Acronym | Expression                                          |
|---------|-----------------------------------------------------|
| SNAP    | Secure Network Access with PKI                      |
| SO      | Security Officer                                    |
| TA      | Trusted Agent                                       |
| TCN     | Third Country National                              |
| TRB     | Technology Review Board                             |
| UPN     | User Principal Name                                 |
| UPS     | Uninterrupted Power Supply                          |
| URI     | Universal Resource Identifier                       |
| URL     | Uniform Resource Locator                            |
| U.S.C.  | United States Code                                  |
| UUID    | Universally Unique Identifier (defined by RFC 4122) |
| VME     | Virtual Machine Environment                         |
| VPN     | Virtual Private Network                             |
| WWW     | World Wide Web                                      |

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## APPENDIX C - GLOSSARY

The following table provides the definitions of selected terms relevant to this Department of State PKI CP.

Table C-3 Glossary

| Term                | Definition                                                                                                                                                                                                                                                          |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Access              | Ability to make use of any information system (IS) resource. NSTISSI 4009                                                                                                                                                                                           |
| Access Control      | The process of granting or denying specific requests to obtain and use information and related information processing services. [NS4009]                                                                                                                            |
| Accreditation       | Formal declaration by a Designated Approving Authority that an Information System is approved to operate in a particular security mode using a prescribed set of safeguards at an acceptable level of risk.                                                         |
| Activation Data     | Private data, other than keys, that are required to access cryptographic modules (i.e., unlock private keys for signing or decryption events).                                                                                                                      |
| Applicant           | The Subscriber sometimes also called an “applicant,” after applying to a Certification Authority for a certificate, but before the certificate issuance procedure is completed. ABSG footnote 32                                                                    |
| Archive             | Long-term, physically separate storage.                                                                                                                                                                                                                             |
| Attribute Authority | An Entity, recognized by the FPKIPA or comparable Entity body as having the authority to verify the association of attributes to an identity.                                                                                                                       |
| Audit               | Independent review and examination of records and activities to assess the adequacy of system controls, to ensure compliance with established policies and operational procedures, and to recommend necessary changes in controls, policies or procedures. [NS4009] |
| Audit Log           | A chronological record of information system activities, including records of system accesses and operations performed in a given period.                                                                                                                           |
| Audit Record        | An individual entry in an audit log related to an audited event.                                                                                                                                                                                                    |
| Authenticate        | To confirm the identity of an Entity when that identity is presented.                                                                                                                                                                                               |

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Table C-3 Glossary

| Term                         | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Authentication               | A security measure designed to protect a communications system against acceptance of fraudulent transmission or simulation by establishing the validity of a transmission, message, originator, or a means of verifying an individual's eligibility to receive specific categories of information. [NS4009]                                                                                                                                                                                                          |
| Backup                       | Copy of files and programs made to facilitate recovery if necessary. [NS4009]                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Binding                      | Assurance of the integrity of an asserted relationship between items of information that is provided by cryptographic means. [NS4009]                                                                                                                                                                                                                                                                                                                                                                                |
| Biometric                    | A measurable, physical characteristic or personal behavioral trait used to identify, or verify the claimed identity of, an individual. Facial images, fingerprints, and iris image samples are all examples of biometrics.                                                                                                                                                                                                                                                                                           |
| CA Facility                  | The collection of equipment, personnel, procedures, and structures that are used by a Certification Authority to perform certificate issuance and revocation.                                                                                                                                                                                                                                                                                                                                                        |
| Card Management System (CMS) | The system that manages the lifecycle of a Smart Card application.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Certificate                  | <p>A digital representation of information, which at least (1) identifies the certification authority issuing it, (2) names or identifies its Subscriber, (3) contains the Subscriber's public key, (4) identifies its operational period, and (5) is digitally signed by the certification authority issuing it. [ABADSG]</p> <p>As used in this CP, the term "Certificate" refers to certificates that expressly reference the OID of this CP in the "Certificate Policies" field of an X.509 v.3 certificate.</p> |

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Table C-3 Glossary

| Term                                   | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Certificate Policy (CP)                | A Certificate Policy is a specialized form of administrative policy tuned to electronic transactions performed during certificate management. A Certificate Policy addresses all aspects associated with the generation, production, distribution, accounting, compromise recovery, and administration of digital certificates. Indirectly, a Certificate Policy can also govern the transactions conducted using a communications system protected by a certificate-based security system. By controlling critical certificate extensions, such policies and associated enforcement technology can support provision of the security services required by particular applications. |
| Certification Practice Statement (CPS) | A statement of the practices that a CA employs in issuing, suspending, revoking, and renewing certificates and providing access to them, in accordance with specific requirements (i.e., requirements specified in this CP, or requirements specified in a contract for services).                                                                                                                                                                                                                                                                                                                                                                                                  |
| Certificate-Related Information        | Information, such as a Subscriber's postal address, that is not included in a certificate. May be used by a CA managing certificates.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Certificate Revocation List (CRL)      | A list maintained by a Certification Authority of the certificates, which it has issued, that are revoked prior to their stated expiration date.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Certificate Status Server (CSS)        | A trusted entity that provides on-line verification to a relying party of a subject certificate's revocation status.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Certification Authority (CA)           | An entity authorized to create, sign, issue, and revoke public key certificates.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Certification Practice Statement (CPS) | A statement of the practices that a CA employs in issuing, suspending, revoking and renewing certificates and providing access to them, in accordance with specific requirements (i.e., requirements specified in this CP, or requirements specified in a contract for services).                                                                                                                                                                                                                                                                                                                                                                                                   |
| Client (application)                   | A system Entity, usually a computer process acting on behalf of a human Subscriber that makes use of a service provided by a server.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Common Criteria                        | A set of internationally accepted semantic tools and constructs for describing the security needs of customers and the security attributes of products.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

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Table C-3 Glossary

| Term                                      | Definition                                                                                                                                                                                                                                                                                  |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Compromise                                | Disclosure of information to unauthorized persons, or a violation of the security policy of a system in which unauthorized intentional or unintentional disclosure, modification, destruction or loss of an object may have occurred. [NS4009]                                              |
| Computer Security Objects Registry (CSOR) | Computer Security Objects Registry operated by the National Institute of Standards and Technology.                                                                                                                                                                                          |
| Confidentiality                           | Assurance that information is not disclosed to unauthorized entities or processes. [NS4009]                                                                                                                                                                                                 |
| Containerization                          | A form of operating system virtualization, through which applications are run in isolated user spaces called containers, all using the same shared operating system (OS).                                                                                                                   |
| Cross-Certificate                         | A certificate used to establish a trust relationship between two Certification Authorities.<br><br>A certificate issued from a certificate authority (CA) that signs the public key of another CA not within its trust hierarchy that establishes a trust relationship between the two CAs. |
| Cryptographic Module                      | A set of hardware, software, and/or firmware that implements approved security functions (including cryptographic algorithms and key generation) and is contained within the cryptographic boundary of the module                                                                           |
| Custodial Subscriber Key Stores           | Custodial Subscriber Key Stores hold keys for a number of Subscriber certificates in one location.                                                                                                                                                                                          |
| Data Decryption Server                    | An automated system that obtains subscriber private keys from the Key Escrow Database or another Data Decryption Server in order to support decryption of data entering and leaving the Enterprise. An example of such data is e-mail.                                                      |
| Data Integrity                            | Assurance that the data are unchanged from creation to reception.                                                                                                                                                                                                                           |
| Device                                    | A non-person entity, i.e., a hardware device/system or a software application.                                                                                                                                                                                                              |

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Table C-3 Glossary

| Term                                                        | Definition                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Digital Signature                                           | The result of a transformation of a message by means of a cryptographic system using keys such that a Relying Party can determine: (1) whether the transformation was created using the private key that corresponds to the public key in the signer's digital certificate; and (2) whether the message has been altered since the transformation was made. |
| Duration                                                    | A field within a certificate, which is composed of two subfields; "date of issue" and "date of next issue."                                                                                                                                                                                                                                                 |
| Encryption Certificate                                      | A certificate containing a public key that is used to encrypt electronic messages, files, documents, or data transmissions, or to establish or exchange a session key for these same purposes.                                                                                                                                                              |
| End-entity                                                  | The Subscriber who is issued a certificate, or a Relying Party who relies on the validity of a certificate.                                                                                                                                                                                                                                                 |
| Entity                                                      | Any department, subordinate element of a department, or independent organizational Entity that is statutorily or constitutionally recognized as being part of the Executive Branch of the Federal Government.                                                                                                                                               |
| Entity CA                                                   | A CA that acts on behalf of an Entity and is under the operational control of the Entity.                                                                                                                                                                                                                                                                   |
| FPKI Management Authority (FPKIMA)                          | The Federal Public Key Infrastructure Management Authority is the organization responsible for operating the Federal Bridge Certification Authority and the Federal Common Policy Certification Authority.                                                                                                                                                  |
| Federal Public Key Infrastructure Policy Authority (FPKIPA) | The FPKIPA is a Federal Government body responsible for setting, implementing, and administering policy decisions regarding the Federal PKI Architecture.                                                                                                                                                                                                   |
| Firewall                                                    | A part of a computer system or network that is designed to block unauthorized access while permitting outward communication. [NS4009]                                                                                                                                                                                                                       |
| Hypervisor                                                  | Computer software, firmware or hardware that creates and runs virtual machines. A hypervisor uses native execution to share and manage hardware, allowing for multiple environments which are isolated from one another, yet exist on the same physical machine. Also known as an isolation kernel or virtual machine monitor.                              |

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Table C-3 Glossary

| Term                                       | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Identity Management System (IDMS)          | One or more systems or applications that perform Identity Lifecycle Management functions such as identity proofing, registration, and issuance processes.                                                                                                                                                                                                                                                                                                                                                                                                             |
| Information System Security Officer (ISSO) | Person responsible to the designated approving authority for ensuring the security of an information system throughout its lifecycle, from design through disposal.                                                                                                                                                                                                                                                                                                                                                                                                   |
| Inside threat                              | A person with authorized access, and thus the potential to harm an information system through destruction, disclosure, modification of data, and/or denial of service.                                                                                                                                                                                                                                                                                                                                                                                                |
| Integrity                                  | Guarding against improper information modification or destruction and includes ensuring information nonrepudiation and authenticity. [NS4009]<br>A state in which information has remained unaltered from the point it was produced by a source, during transmission, storage and eventual receipt by the destination.                                                                                                                                                                                                                                                |
| Intellectual Property                      | Useful artistic, technical and/or industrial information, knowledge or ideas that convey ownership and control of tangible or virtual usage and/or representation.                                                                                                                                                                                                                                                                                                                                                                                                    |
| Intermediate CA                            | A CA that is subordinate to another CA and has a CA subordinate to itself.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Key Escrow                                 | The retention of the private component of the key pair associated with a subscriber's encryption certificate to support key recovery. [NS4009]<br>A deposit of the private key of a Subscriber and other pertinent information pursuant to an escrow agreement or similar contract binding upon the Subscriber, the terms of which require one or more agents to hold the Subscriber's private key for the benefit of the Subscriber, an employer, or other party, upon provisions set forth in the agreement. [adapted from ABADSG, "Commercial key escrow service"] |
| Key Escrow Database (KED)                  | The function, system, or subsystem that maintains the key escrow repository and responds to key escrow and key recovery requests from one or more Key Recovery Agents, as specified by this policy.                                                                                                                                                                                                                                                                                                                                                                   |
| Key Exchange                               | The process of exchanging public keys in order to establish secure communications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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Table C-3 Glossary

| Term                                    | Definition                                                                                                                                                                                                                                                                                           |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Key Generation Ceremony                 | A scripted ceremony held to generate the cryptographic signing key for a Certification Authority.                                                                                                                                                                                                    |
| Key Generation Material                 | Random numbers, pseudo-random numbers, and cryptographic parameters used in generating cryptographic keys.                                                                                                                                                                                           |
| Key Pair                                | Two mathematically related keys having the properties that (i) one key can be used to encrypt a message that can only be decrypted using the other key, and (ii) even knowing one key, it is computationally infeasible to discover the other key.                                                   |
| Key Recovery                            | Production of a copy of an escrowed key and delivery of that key to an authorized requestor.                                                                                                                                                                                                         |
| Key Recovery Agent (KRA)                | An individual authorized to interface with the key escrow database in conjunction with one or more other key recovery agents) to cause the key escrow database to carry out key recovery requests, as specified by this policy.                                                                      |
| Key Recovery Official (KRO)             | An individual authorized to authenticate and submit key recovery requests to the Key Recovery Agent on behalf of requestor, as specified by this policy.                                                                                                                                             |
| Key Recovery Policy (KRP)               | A key recovery policy is a specialized form of administrative policy tuned to the protection and recovery of key management private keys (i.e. decryption keys) held in escrow. A key recovery policy addresses all aspects associated with the storage and recovery of key management certificates. |
| Key Recovery Practices Statement (KRPS) | A statement of the practices that a Key Recovery System employs in protecting and recovering key management private keys, in accordance with specific requirements (i.e., requirements specified in the KRP).                                                                                        |
| Legacy PKI                              | A PKI operated by a Federal Department/Agency that has been cross-certified with the Federal Bridge CA (FBCA) at the Medium Hardware or High Assurance Level.                                                                                                                                        |
| Local Registration Authority (LRA)      | A Registration Authority with responsibility for a local community.                                                                                                                                                                                                                                  |

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Table C-3 Glossary

| Term                            | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| Memorandum of Agreement (MOA)   | <p>Agreement between the FPKIPA and an Entity allowing interoperability between the Entity Principal CA and the FBCA and/or FCPCA.</p> <p>Agreement between the DOS OPKI and an External Entity PKI allowing interoperability between the two PKIs which is enabled via cross-certification between them.</p>                                                                                                                                                                                                                                                                                                                            |
| Modification (of a certificate) | The act or process by which data items bound in an existing public key certificate are changed by issuing a new certificate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Mutual Authentication           | Occurs when parties at both ends of a communication activity authenticate each other (see authentication).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Naming Authority                | An organizational Entity responsible for assigning distinguished names (DNs) and for assuring that each DN is meaningful and unique within its domain.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| National Security System        | Any telecommunications or information system operated by the United States Government, the function, operation, or use of which involves intelligence activities; involves cryptologic activities related to national security; involves command and control of military forces; involves equipment that is an integral part of a weapon or weapons system; or is critical to the direct fulfillment of military or intelligence missions, but does not include a system that is to be used for routine administrative and business applications (including payroll, finance, logistics, and personnel management applications). [ITMRA] |
| Network Guard                   | An enclave boundary protection device that controls access between a local area network that an enterprise system has a requirement to protect with a high degree of assurance, and an external network that is outside the control of the enterprise system.                                                                                                                                                                                                                                                                                                                                                                            |
| Non-Repudiation                 | <p>Protection against an individual who falsely denies having performed a certain action and provides the capability to determine whether an individual took a certain action, such as creating information, sending a message, approving information, or receiving a message. [NS4009]</p> <p>Technical non-repudiation refers to the assurance a Relying Party has that if a public key is used to validate a digital signature, that signature had to have been made by the corresponding private signature key.</p> <p>.</p>                                                                                                         |

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Table C-3 Glossary

| Term                          | Definition                                                                                                                                                                                                                                                                                                                                                                            |
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| Object Identifier (OID)       | A specialized formatted number that is registered with an internationally recognized standards organization. The unique alphanumeric/numeric identifier registered under the ISO registration standard to reference a specific object or object class. In the federal government PKI, they are used to identify uniquely each of the policies and cryptographic algorithms supported. |
| Offline CA                    | An offline certification authority is a certification authority isolated from network access and is often kept in a powered-down state.                                                                                                                                                                                                                                               |
| One Badge                     | The DOS PIV card along with its Facility and Logical Access Card (FLAC) and Facility Access Card (FAC) variants are collectively referred to as the One Badge.                                                                                                                                                                                                                        |
| Only Locally Trusted (OLT)    | Refers to certificates that are only trusted within the Department of State.                                                                                                                                                                                                                                                                                                          |
| Out-of-Band                   | Communication between parties utilizing a means or method that differs from the current method of communication (e.g., one party uses U.S. Postal Service mail to communicate with another party where current communication is occurring online).                                                                                                                                    |
| Outside Threat                | An unauthorized Entity from outside the domain perimeter that has the potential to harm an Information System through destruction, disclosure, modification of data, and/or denial of service.                                                                                                                                                                                        |
| Physically Isolated Network   | A network that is not connected to entities or systems outside a physically controlled space.                                                                                                                                                                                                                                                                                         |
| PKI Sponsor                   | A PKI Sponsor fills the role of a Subscriber for groups, organizations, disabled personnel, and non-human system components named as public key certificate subjects, and is responsible for meeting the obligations of Subscribers as defined throughout this CP.                                                                                                                    |
| Plan of Action and Milestones | A tool that identifies tasks that need to be accomplished. It details resources required to accomplish the elements of the plan, any milestones in meeting the tasks, and scheduled completion dates for the milestones.                                                                                                                                                              |

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Table C-3 Glossary

| Term                              | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| Policy Management Authority (PMA) | <p>The individual or group that is responsible for the creation and maintenance of Certificate Policies and Certification Practice Statements, and for ensuring that all Entity PKI components (e.g., CAs, CSSs, Card Management Systems, RAs) are audited and operated in compliance with the entity PKI CP. The PMA evaluates non-domain policies for acceptance within the domain, and generally oversees and manages the PKI certificate policies.</p> <p>The FPKIPA is the PMA for the FBCA and Federal Common Policy Framework CPs. The DOS Deputy Chief Information Officer is the PMA for the DOS OPKI CP and has delegated that authority to the Chief of the Systems Integrity (SI) Division.</p> |
| Principal CA                      | The Principal CA is a CA designated by an Entity to interoperate with the FBCA and/or FCPCA. An Entity may designate multiple Principal CAs to interoperate with the FBCA and/or FCPCA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Privacy                           | Restricting access to Subscriber or Relying Party information in accordance with Federal law.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Private Key                       | A mathematical key (kept secret by the holder) used to create digital signatures and, depending upon the algorithm, to decrypt messages or files encrypted (for confidentiality) with the corresponding public key.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Public Key                        | A mathematical key that is publicly available and that applications use to encrypt data or to verify digital signatures created with its corresponding private key.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Public Key Infrastructure (PKI)   | The architecture, organization, policies, practices and procedures, server platforms, software and workstations that collectively support the implementation and operation of a certificate-based public key cryptographic system used for the purpose of administering certificates and public-private key pairs, including the ability to issue, maintain, and revoke public key certificates.                                                                                                                                                                                                                                                                                                            |
| Registration Authority (RA)       | An entity authorized by the certification authority to collect, verify, and submit information provided by potential Subscribers which is to be entered into public key certificates. The term RA refers to hardware, software, and individuals that collectively perform this function.                                                                                                                                                                                                                                                                                                                                                                                                                    |

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Table C-3 Glossary

| Term                   | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| Re-key (a certificate) | The process of creating a new certificate with a new validity period, serial number, and public key while retaining all other Subscriber information in the original certificate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Relying Party          | A person or Entity that relies on the validity of the binding of the Subscriber's name to a public key to verify or establish the identity and status of an individual, role, system or device; the integrity of a digitally signed message; the identity of the creator of a message; or confidential communications with the Subscriber.                                                                                                                                                                                                                                                                                                                                          |
| Remote Workstation     | <p>A workstation used to administer the CA, CMS, CSS and/or associated HSMs from a secure location outside the security perimeter of the equipment being administered. The secure location housing the Remote Workstation should be protected as a logical extension of the enclave in which the administered CA equipment resides. A remote workstation is not connected to the CA, CMS, CSS and/or HSM via a dedicated network.</p> <p>Note: Reference Section 5.1, 6.5, 6.6.1, and 6.7 for additional technical controls required of remote workstations. This term does not refer to consoles within the CA's security perimeter or to Registration Authority workstations.</p> |
| Renew (a certificate)  | Renewing a certificate means creating a new certificate with a new serial number where all certificate subject information, including the subject public key and subject key identifier, remain unchanged. The new certificate may have an extended validity period and may include new issuer information (e.g., different CRL distribution point, AIA and/or be signed with a different issuer key).                                                                                                                                                                                                                                                                              |
| Repository             | A system containing data relating to certificates or revocation data as specified in this CP. May refer to a directory, web server, or server which only hosts pre-generated OCSP responses.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Responsible Individual | A trustworthy person designated by a sponsoring organization to authenticate individual applicants seeking certificates on the basis of their affiliation with the sponsor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Revoke a Certificate   | The process of permanently ending the binding between a certificate and the identity asserted in the certificate from a specified time forward, prematurely ending the operational period of the certificate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

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Table C-3 Glossary

| Term                  | Definition                                                                                                                                                                                                                                                                                                                                           |
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| Risk                  | A measure of the extent to which an entity is threatened by a potential circumstance or event and typically is a function of: (i) the adverse impact, or magnitude of harm, that would arise if the circumstance or event occurs; and (ii) the likelihood of occurrence.                                                                             |
| Risk Tolerance        | The level of risk an entity is willing to accept in order to achieve a potential desired result.                                                                                                                                                                                                                                                     |
| Root CA               | In a hierarchical PKI, the CA whose public key serves as the most trusted datum (i.e., the beginning of trust paths) for a security domain.                                                                                                                                                                                                          |
| Server                | A system entity that provides a service in response to requests from clients.                                                                                                                                                                                                                                                                        |
| Signature Certificate | A public key certificate that contains a public key intended for verifying digital signatures rather than encrypting data or performing any other cryptographic functions.                                                                                                                                                                           |
| Sponsor               | An individual who represents a device or group in all certificate life-cycle activities. A PKI Sponsor asserts that the certificate and associated private key are being used in accordance with the subscriber and certificate specific obligations in this CP.                                                                                     |
| Subordinate CA        | In a hierarchical PKI, a CA whose certificate signature key is certified by another CA, and whose activities are constrained by that other CA. (See superior CA).                                                                                                                                                                                    |
| Subscriber            | A Subscriber is an Entity that (1) is the subject named or identified in a certificate issued to that Entity, (2) holds a private key that corresponds to the public key listed in the certificate, and (3) does not itself issue certificates to another party. This includes, but is not limited to, an individual, application or network device. |
| Superior CA           | In a hierarchical PKI, a CA who has certified the certificate signature key of another CA, and who constrains the activities of that CA. (See subordinate CA).                                                                                                                                                                                       |

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Table C-3 Glossary

| Term                                | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| Supervised Remote Identity Proofing | A real-time identity proofing event where the RA/Trusted Agent is Proofing not in the same physical location as the applicant/subscriber. The RA/Trusted Agent controls a device which is utilized by the applicant/subscriber in order to ensure the remote identity proofing process employs physical, technical and procedural measures to provide sufficient confidence that the remote session can be considered equivalent to a physical, in-person identity proofing process. Supervised Remote Identity Proofing must meet the criteria specified in NIST SP 800-63A Section 5.3.3; and must have the capacity to capture an approved biometric. |
| System High                         | The highest security level supported by an information system. [NS4009]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| System Software Layer               | A layer of software that manages lower layer hardware and software resources and provides services through well-defined interfaces to the higher layers of software. Examples of system software layers are virtual machines, hypervisors, operating systems, and any containerized architectures.                                                                                                                                                                                                                                                                                                                                                       |
| Technical non-repudiation           | The contribution public key mechanisms to the provision of technical evidence supporting a non-repudiation security service.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Threat                              | Any circumstance or event with the potential to adversely impact organizational operations (including mission, functions, image, or reputation), organizational assets, individuals, other organizations, or the Nation through an information system via unauthorized access, destruction, disclosure, modification of information, and/or denial of service. [NS4009]                                                                                                                                                                                                                                                                                  |
| Trust List                          | Collection of trusted certificates used by Relying Parties to authenticate other certificates.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Trusted Agent (TA)                  | An individual explicitly aligned with one or more registration authority (RA) officers who has been delegated the authority to confirm Subscriber identification during the registration process. A trusted agent (TA) does not have privileged access to the certification authority to authorize certificate issuance, revocation, renewal, modification, or re-key, or key recovery.                                                                                                                                                                                                                                                                  |

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Table C-3 Glossary

| Term                        | Definition                                                                                                                                                                                                                                                                                                                                                          |
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| Trusted Certificate         | A certificate that is trusted by the Relying Party on the basis of secure and authenticated delivery. The public keys included in trusted certificates are used to start certification paths. Also known as a "trust anchor."                                                                                                                                       |
| Trusted Timestamp           | A digitally signed assertion by a trusted authority that a specific digital object existed at a particular time.                                                                                                                                                                                                                                                    |
| Trustworthy System          | Computer hardware, software, and procedures that: (1) are reasonably secure from intrusion and misuse; (2) provide a reasonable level of availability, reliability, and correct operation; (3) are reasonably suited to performing their intended functions; and (4) adhere to generally accepted security procedures.                                              |
| Two-Person Control          | Continuous surveillance and control of material at all times by a minimum of two authorized individuals, each capable of detecting incorrect and/or unauthorized procedures with respect to the task being performed; and each familiar with established security and safety requirements. [NS4009]                                                                 |
| Update (a certificate)      | The act or process by which data items bound in an existing public key certificate, especially authorizations granted to the subject, are changed by issuing a new certificate.                                                                                                                                                                                     |
| Virtual Machine Environment | An emulation of a computer system that provides the functionality of a physical machine in a platform-independent environment. It consists of a host (virtual machine) and isolation kernel (hypervisor) and provides functionality needed to execute entire operating systems.                                                                                     |
| Wildcard Certificate        | A wildcard certificate is a certificate issued to a system or device that contains a wildcard designator (*) that may be included in the Common Name (CN) in the <i>Subject</i> field, if appropriate, but must be included in the <i>subjectAltName</i> (SAN) extension. A wildcard certificate allows multiple servers to share the same public-private key pair. |
| Zeroize                     | A method of erasing electronically stored data by altering or deleting the contents of the data storage so as to prevent the recovery of the data.                                                                                                                                                                                                                  |