



**X.509 Certificate Policy**  
**for the**  
**Government Printing Office**  
**Public Key Infrastructure (PKI)**  
**(including the GPO Principal Certification**  
**Authority, PCA, and GPO Subordinate**  
**Certification Authority, SCA, which together are**  
**referred to as GPO-CA)**

**April 22, 2020**

**Version 1.8.1**

**FOR OFFICIAL USE ONLY**

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## **SIGNATURE PAGE**

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Chair, Government Printing Office Public Key Infrastructure Steering Committee      DATE

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Chair, Government Printing Office Public Key Infrastructure Policy Authority      DATE

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Government Printing Office Public Key Infrastructure Operational Authority      DATE

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## RECORD OF CHANGES

<b>Version</b>	<b>Date</b>	<b>Author(s)</b>	<b>Reason</b>	<b>Description</b>
1.0	8 September 2003	CygnaCom Solutions, Inc	Initial Document	Initial Document
1.0.1	1 October 2004	CygnaCom Solutions, Inc	Minor changes for FBCA CP mapping for FBCA cross certification	Address the four comments from the FBCA CP mapping
1.1	27 February 2006	U.S. Government Printing Office	Changes to comply with Federal PKI Common Policy and PKI Shared Service Provider (SSP) requirements	Changes in various sections to comply with Federal PKI Common Policy and PKI Shared Service Provider (SSP) requirements
1.2	1 July 2006	U.S. Government Printing Office	Changes to comply with AICPA WebTrust for CA audit requirements	Changes in various sections to comply with the AICPA WebTrust for CA audit requirements, as recommended by WebTrust auditor and GPO OIG recommendations.

<b>Version</b>	<b>Date</b>	<b>Author(s)</b>	<b>Reason</b>	<b>Description</b>
1.3	March 14, 2009	U. S. Government Printing Office	Changes to format the CP to the RFC 3647 requirements, to include GPO specific policy requirements for GPO Medium-Hardware Assurance, GPO Authentication and GPO CardAuth certificates, and general compliance with the Federal PKI FBCA CP and Common Policy.	Changes to various sections to address GPO specific policy requirements for GPO Medium-Hardware Assurance, GPO Authentication and GPO CardAuth certificates, for RFC 3647 format, and for general compliance with the Federal PKI Common Policy and FBCA CP.
1.3.1	August 17, 2009	U.S. Government Printing Office	Minor updates to respond to Federal PKI Certificate Policy Working Group (CPWG) comments.	Changes to certain sections to address CPWG comments.
1.4	May 30, 2016	U.S. Government Printing Office	Maintain alignment to FBCA CP.	Changes to many sections to maintain alignment of the GPO PKI (CA) CP to the FBCA CP.
1.5	March 21, 2017	U.S. Government Printing Office	Maintain alignment to FBCA CP.	Changes to sections 5.6, added new section 6.2.1.1 and added entry to Glossary to maintain alignment of GPO CP with FBCA CP.

Version	Date	Author(s)	Reason	Description
1.6	February 20, 2018	U.S. Government Printing Office	Based on discussions with Federal PKI Policy Authority on CP Mapping Matrix review to: 1) remove references to SHA-1 and 1024 bit certificates since these are not used by GPO PKI; 2) clarify that the GPO CA/PKI is not a Bridge (the only cross-certification is through the Federal PKI Trust Infrastructure, including the FBCA; 3) remove references to PIV-I and/or PIV OIDs (since GPO PKI does not issue PIV or PIV-I OIDs at this time); and 4) align this CP with approved Federal PKI Change Proposals to the FBCA CP and Common Policy CP.	Changes to various sections, including: 1, 1.1.4, 1.1.5, 1.2, 1.3.1 (and most sub-sections), 1.4.1, 3.2.3.1, 3.3.1, 4.1, 4.7, 5.7.3 (and sub-sections), 6.1.1.1, 6.1.4, 6.1.5, 6.2.3.2, and 7.1.3. Also for FPKI CP approved Change Proposals, changes to sections 4.12.1, 7.1.7, 1.3.1.6, 4.4.3, 4.9, 5.8, 9.11, 1.3.1.5, 3.2.6, 5.6 and 5.7.

<b>Version</b>	<b>Date</b>	<b>Author(s)</b>	<b>Reason</b>	<b>Description</b>
1.7	June 8, 2018	U.S. Government Printing Office	Based on discussions with Federal PKI Policy Authority on CP Mapping Matrix review to align the GPO CP with FPKI CP as follows: 1) include requirement that CA and End Entity certificates contain valid URI's; 2) clarify Subscriber responsibilities; 3) clarify contact information for the GPO CA and that suitability of GPO CA CPS to the CP shall be based on compliance auditor assessment; and 4) clarify End entity device certificate policy mapping requirements.	Changes to the following sections: 2.2.1, 9.6.3, 1.5.2, 1.5.3 and 1.2.

Version	Date	Author(s)	Reason	Description
1.8	April 5, 2019	U.S. Government Printing Office	Changes made based on FPKI Program Office annual review of GPO PKI, and to incorporate all FPKI approved FBCA Certificate Policy Change Proposals.	<p>Changes to the following sections for comments from the FPKI based on the FPKI Annual Review: sections 1, 1.1.1, 1.3.1.5, 1.3.1.6, 1.4.2, 2.2.2, 3.2.6, 3.3.1, 4.3, 4.7.4, 5.6, 6.1.5, 7.1.7, 9.6.1 and 9.6.2.</p> <p>Changes to the following sections for FBCA CP Change Proposals: 8, 8.1 and 8.6 (FBCA CP Change Proposal 2018-02), 6.1.7 (FBCA CP Change Proposal 2018-03), 4.9.3 (FBCA CP Change Proposal 2018-04), 5.4, 6.5 and 6.6.1 (FBCA CP Change Proposal 2018-05), 3.2.3.1, 3.2.3.2, 6.2.8, 9.4.2 and 9.4.4 (FBCA CP Change 2018-06).</p> <p>Miscellaneous formatting and typographical errors were fixed also (sections 2.3, 3.2.3.3, 4.1.1.2, 4.3.2, and 6.2.11).</p>

<b>Version</b>	<b>Date</b>	<b>Author(s)</b>	<b>Reason</b>	<b>Description</b>
1.8.1	April 22, 2020	U.S. Government Printing Office	Changes made based on FPKI Program Office annual review of GPO PKI and FPKI Program Office comments, and to incorporate all FPKI approved FBCA Certificate Policy Change Proposals.	Changes to: 1) sections 4.9.3 and 4.9.7 to accommodate FBCA Certificate Policy Change Proposal Number 2019-01; 2) sections 1, 1.2, 1.3.1.6, 3.2.3.1, 4.7.4, 4.9.3, 4.9.7, 6.2.10, 9.3, 9.4.2, 9.4.6, 9.6.1, 9.6.2, 9.7, 9.8, and 9.12.3 to address FPKI Program Office comments.

## **1. INTRODUCTION**

This Certificate Policy (CP) defines the certificate policy for use by the Government Printing Office (GPO) Public Key Infrastructure (PKI), which is made up of the GPO Principal Certification Authority (GPO PCA) and the GPO Subordinate CA (GPO SCA), to facilitate interoperability between the GPO PKI and other PKI Domains. There are only two (2) CA's operated by the GPO, the GPO PCA, which is the Root CA (trust anchor), and the GPO SCA, which is the issuing CA for the Subscriber and Device certificates. The term GPO-CA is used in this document and refers to both the GPO PCA and SCA in general, and if only applicable to one of the CA's will spell out to which GPO CA (the GPO PCA or GPO SCA) it applies to, in general, in the remainder of this document. This policy represents Medium Assurance and Medium-Hardware Assurance Levels for public key digital certificates. In addition, this policy includes certificate types for Medium Assurance Device certificates. The word "assurance" used in this CP means how well a Relying Party can be certain of the identity binding between the public key and the individual whose subject name is cited in the certificate. In addition, it also reflects how well the Relying Party can be certain that the individual whose subject name is cited in the certificate is controlling the use of the private key that corresponds to the public key in the certificate, and how securely the system which was used to produce the certificate and (if appropriate) deliver the private key to the subscriber performs its task.

This GPO CP is consistent with the Internet Engineering Task Force (IETF) Public Key Infrastructure X.509 (IETF PKIX) RFC 3647, Certificate Policy and Certification Practices Statement Framework.

The terms and provisions of this GPO CP shall be interpreted under and governed by applicable Federal law.

### **1.1 OVERVIEW**

#### **1.1.1 Certificate Policy (CP)**

GPO-CA certificates contain a registered certificate policy object identifier (OID), which may be used by a Relying Party to decide whether a certificate is trusted for a particular purpose. The party that registers the OID (in this case, the U.S. Government GPO) also publishes the CP, for examination by Relying Parties.

#### **1.1.2 Relationship Between the GPO CP and CPS**

The GPO CP states what assurance can be placed in a certificate issued by the GPO-CA. The GPO CPS states how the GPO-CA establishes that assurance.

#### **1.1.3 Relationships between GPO PKI CP, the FBCA and Other Entity CPs**

The Federal PKI Policy Authority (FPKIPA) maps levels of assurance between the FBCA and various Entity CAs to facilitate interoperability. Because GPO PKI is a Federal Legacy PKI, its CP is mapped against that of the federal PKI Federal Bridge CA (FBCA). The GPO PKI CP is consistent with the FBCA CP and federal PKI for all certificate policies that are either directly asserted or mapped to the Federal PKI policies.

#### **1.1.4 Scope**

The GPO-CA exists to facilitate trusted electronic business transactions for the GPO and federal organizations. To facilitate the missions of the GPO and federal organizations, interoperability is offered to non-federal entities in accordance with federal PKI requirements, federal law and GPO business processes. The interoperability information in this CP applies equally to federal organizations and other organizations owning or operating PKI domains. For this CP at this time, the only Entity CA the GPO CA has an interoperability relationship and requirement for is the Federal PKI Trust Infrastructure, including the Federal Bridge CA (FBCA).

#### **1.1.5 Interoperation with PKIs External to the Federal Government**

This CP provides for interoperability with Entity CAs (CAs external to the GPO, non-GPO-CAs) through cross certification. Interoperability will be established when directed by the GPO-PA and will require a Memorandum of Agreement (MOA), between the GPO-CA and the Entity CA, and may require changes to this CP to address issues associated with liability and other matters. In particular, interoperation with the Federal PKI Common Policy Framework and the Federal Bridge CA are facilitated by this CP. For this CP at this time, the only Entity CA the GPO CA has an interoperability relationship and requirement for is the Federal PKI Trust Infrastructure, including the Federal Bridge CA (FBCA).

## **1.2 DOCUMENT NAME AND IDENTIFICATION**

The Medium Assurance, Medium-Hardware Assurance and Device levels are defined in subsequent sections of this CP. The GPO Medium Assurance, Medium-Hardware Assurance and Device levels have corresponding Object Identifiers (OIDs), to be asserted in certificates issued by the GPO-CA, which comply with the policy stipulations herein. The OIDs are registered under the id-infosec arc as follows:

csor-certpolicy ::= {2 16 840 1 101 3 2 1}

id-gpo-policies ::= {csor-certpolicy 17}

id-gpo-certpcy-mediumAssurance ::= {2 16 840 1 101 3 2 1 17 1}

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id-gpo-certpcy-mediumHardware	::= {2 16 840 1 101 3 2 1 17 2}
id-gpo-certpcy-devices	::= {2 16 840 1 101 3 2 1 17 3}

End-entity certificates issued to devices shall assert policies mapped to id-gpo-certpcy-devices. The OID's id-gpo-certpcy-mediumAssurance and id-gpo-certpcy-mediumHardware are reserved for human subscribers when used in end-entity certificates.

End-Entity certificates issued to devices after October 1, 2016 shall assert policies mapped to FBCA Medium Device, Medium Device Hardware, or PIV-I Content Signing policies. All other policies defined in this document should be reserved for human subscribers when used in End-Entity certificates.

### 1.3 PKI PARTICIPANTS

The following are roles relevant to the administration and operation of the GPO-CA.

#### 1.3.1 PKI Authorities

##### 1.3.1.1 GPO PKI Policy Authority

The GPO PKI Policy Authority (PA) is a group of GPO personnel. The GPO-PKI-PA (or GPO-PA) is responsible for:

- The Government Printing Office Certification Authority (GPO-CA) Certificate Policy (CP)
- The GPO-CA Certification Practices Statement (CPS)
- Accepting applications from other PKI Domains desiring to interoperate with the GPO-CA
- Determining the mappings between certificates issued by applicant Entity CAs and the levels of assurance set forth in the GPO-CA-CP (which will include objective and subjective evaluation of the respective CP contents and any other facts deemed relevant by the GPO-PA); for this CP at this time, the only Entity CA the GPO CA has an interoperability relationship and requirement for is the Federal PKI Trust Infrastructure, including the Federal Bridge CA (FBCA).
- After a CA is authorized to interoperate with the GPO-CA, ensuring continued conformance of the Entity PKI Domain with applicable requirements is a condition for allowing continued interoperability with the GPO-CA; for this CP at this time, the only Entity CA the GPO CA has an interoperability relationship and requirement for is the Federal PKI Trust Infrastructure, including the Federal Bridge CA (FBCA).

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The GPO-PA will enter into an MOA with the applicant Entity setting forth the respective responsibilities and obligations of both parties, and the mappings between the certificate levels of assurance contained in this CP and those of the Entity CP. Thus, the term “MOA” as used in this CP shall always refer to the Memorandum of Agreement cited in this paragraph.

### **1.3.1.2 GPO Operational Authority**

The GPO Operational Authority (OA) is the organization that operates the GPO-CA, including issuing GPO-CA certificates when directed by the GPO-PA, posting those certificates, Certificate Authority Revocation Lists (CARLs) and Certificate Revocation Lists (CRLs) into the GPO-CA repository, operating the OCSP system, and ensuring the continued availability of the repository to all users. The GPO-CA Operational Authority includes but is not limited to the following roles: Oversight Administrator, Officer, System Administrator, and Backup Operator, all described in later sections of this CP.

### **1.3.1.3 GPO Operational Authority Oversight Administrator**

The OA Oversight Administrator (OAOA) is the individual within the GPO-OA who has principal responsibility for overseeing the proper operation of the GPO-CA including the GPO-CA repository, and who appoints individuals to the positions of GPO-CA Operational Authority (OA).

### **1.3.1.4 GPO Operational Authority Officers**

These officers are the individuals within the GPO-OA, selected by the GPO-OAOA, who operate the GPO-CA and its repository including executing GPO-PA direction to issue CA certificates to CAs or taking other action to effect interoperability between the GPO-CA and Entity CAs. For this CP at this time, the only Entity CA the GPO CA has an interoperability relationship and requirement for is the Federal PKI Trust Infrastructure, including the Federal Bridge CA (FBCA).

### **1.3.1.5 Entity Certification Authority**

An Entity wishing to interoperate with the GPO may apply for interoperation. Interoperation requires a mapping between the Entity CP and the GPO CP must be completed and an MOA must be in place. The Policy Mapping and MOA are put in place to ensure the level of security on the Entity CA is comparable to the GPO-CA and specify any additional requirements. For this CP at this time, the only Entity CA the GPO CA has an interoperability relationship and requirement for is the Federal PKI Trust Infrastructure, including the Federal Bridge CA (FBCA). The intent of the GPO-CA and GPO PKI is to have an interoperability relationship solely with the FPKI.

It should be noted that in accordance with the FPKI and FBCA CP, the GPO PA may request that the FBCA cross-certify with more than one CA from GPO; that is the GPO may have more than one (1) Principal CA. At this time, the GPO PKI has only one (1) Principal CA.

The GPO PA shall ensure that no CA under the GPO PKI shall have more than one trust path to the FBCA (regardless of path validation results).

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### **1.3.1.6 GPO Certification Authority**

The GPO-CA is the entity operated by the GPO-OA that is authorized by the GPO-PA to create, sign, and issue public key certificates to GPO Subordinate CAs. The GPO-CA is therefore the Root CA of the GPO PKI. The GPO-CA is responsible for all aspects of the issuance and management of a certificate including:

- Control over the registration process
- The identification and authentication process
- The certificate manufacturing process
- Publication of certificates
- Revocation of certificates
- Re-key of GPO-CA signing material
- Ensuring that all aspects of the GPO-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

The GPO Principal CA (PCA) is the CA within the GPO PKI that has been designated to interoperate directly with GPO Subordinate CAs and approved Entity CAs, and which issues, either end-entity certificates, cross-certificates, or other means of interoperation. For this CP at this time, the only Entity CA the GPO-CA has an interoperability relationship and requirement for is the Federal PKI Trust Infrastructure, including the Federal Bridge CA (FBCA). The GPO-CA, the GPO PCA, is the Root CA for the GPO PKI. Additionally, this CP may refer to CAs that are “subordinate” to the PCA. The GPO shall have at least one (1) Subordinate CA (SCA), which is referred to as the GPO SCA, and at this time has only one (1) GPO SCA.

To summarize, the GPO PKI has one (1) GPO-CA (PCA), which is the Root CA of the GPO PKI, and one (1) GPO SCA. There are no other CA’s in the GPO PKI at this time. The term GPO-CA refers to the GPO PCA in this CP.

The GPO CA Policy Authority representative or Operational Authority representative shall be responsible for notifying the FPKIPA of any change to the infrastructure of the GPO PKI or GPO-CA that has the potential to affect the FPKI operational environment at least two (2) weeks prior to the implementation; all new artifacts (CA certificates, CRL DP, AIA and/or SIA URLs, etc.) produced as a result of the change shall be provided to the FPKIPA within 24 hours following implementation.

### **1.3.1.7 GPO Registration Authority**

The GPO Registration Authority (RA) is the entity that collects and verifies each End Entity’s identity and information to be entered into his or her public key certificate. The GPO-RA performs its function in accordance with the GPO CPS approved by the GPO-PA. The requirements for GPO-RAs are set forth in the sections below.

### **1.3.1.8 GPO Naming Authority**

The GPO Naming Authority is the entity that is responsible for managing the GPO name space.

### **1.3.1.9 GPO Certificate Status Servers**

The GPO PKI includes an authority that provides status information about certificates on behalf of the GPO CA through online transactions. In particular, the GPO PKI includes OCSP responders to provide online status information. The GPO Certificate Status Server (CSS) is the entity that provides status information about certificates on behalf of the GPO CA through online transactions. The GPO CSS performs its function in accordance with the GPO CPS and this CP.

### **1.3.2 Related Authorities**

CAs operating under this CP will require the services of other security, community, and application authorities, such as compliance auditors and attribute authorities. The GPO CPS shall identify the parties responsible for providing such services, and the mechanisms used to support these services.

### **1.3.3 Trusted Agents**

The trusted agent is a person who satisfies all the trustworthiness criteria of an RA and who performs identity proofing as a proxy for the RA. The trusted agent records information from and verifies biometrics (e.g., photographs, etc.) of credentials presented by applicants who cannot appear in person at an RA. The CPS will identify the parties that are authorized to provide such services and the mechanisms for determining their trustworthiness.

### **1.3.4 Subscribers**

A Subscriber is the entity whose name appears as the subject in a certificate, who asserts that it uses its key and certificate in accordance with the CP asserted in the certificate, and who does not issue certificates. Subscribers include all organizational personnel and, when determined by the GPO-PA, other individuals and possibly certain network or hardware devices such as firewalls and routers when needed for infrastructure protection. CAs are sometimes technically considered “subscribers” in a PKI. 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.

### **1.3.5 Relying Parties**

A Relying Party is the entity that relies on the validity of the binding of the Subscriber's name to a public key. The Relying Party is responsible for deciding whether or how to check the validity of the certificate by checking the appropriate certificate status information. The Relying Party can use the certificate to verify the integrity of a digitally signed message, to identify the creator of a message, or to establish confidential communications with the holder of the certificate. 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.

### 1.3.6 Other Participants

The GPO-CA will require the participation of compliance auditors and assessors from time to time in accordance with this CP, and may involve participation from personnel in the information security community in accordance with this CP.

## 1.4 CERTIFICATE USAGE

### 1.4.1 Appropriate Certificate Uses

Authorized applications are approved for the following security services provided by the GPO PKI:

- User Authentication
- Logical Access Control
- Secure Communication
- Digital Signature/Non-repudiation
- Card Authentication (card/token only; not presenter)

The GPO PA may identify additional authorized applications. This CP will be updated as new authorized applications are identified.

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. (NOTE: The Rudimentary, Basic and High Assurance Levels, as defined and described in the Federal PKI and Federal Bridge CA CP, are not used at this time by the GPO PKI and are therefore not in the table below.) These descriptions are guidance and are not binding

Assurance Level	Appropriate Certificate Uses
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

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	following certificate policies: Medium, Medium Hardware, and Medium Device.

### **1.4.2 Prohibited Certificate Uses**

Applications that attempt to use these certificates for services other than those identified are prohibited.

## **1.5 POLICY ADMINISTRATION**

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

The GPO-PA is responsible for all aspects of this CP.

### **1.5.2 Contact Person**

Questions regarding this CP shall be directed to the GPO PKI Operational Authority contact, whose contact information and address can be found at the GPO PKI web site (<https://www.gpo.gov/how-to-work-with-us/agency/services-for-agencies/public-key-infrastructure>), or to the designee of the Chair of the GPO-PA, the GPO Chief Information Security Officer, who can be reached by email at: [pkisupport@gpo.gov](mailto:pkisupport@gpo.gov).

### **1.5.3 Person Determining CPS Suitability for the Policy**

The GPO-PA shall approve the GPO CPS. The determination of suitability of the GPO CPS to this CP and Policy shall be based on an independent compliance auditor's results and recommendations. See Section 8 for further details.

### **1.5.4 CPS Approval Procedures**

The GPO-PA shall approve the GPO CPS. The GPO-PA shall review the CPS at least once every year to determine if changes are required.

## **1.6 DEFINITIONS AND ACRONYMS**

See sections 11 and 12 of this CP.

## **2. PUBLICATION OF CERTIFICATE INFORMATION**

### **2.1 REPOSITORIES**

The publication of data to the repositories will be appropriate to the certificate using community, and in accordance with the local security requirements. This includes information about certificate owners and organizations policies in addition to the directories containing the certificates and CRLs. Publication of certificates to the directories will constitute notification to all subscribers of the issuance of certificates. To facilitate the widest use of certificates, GPO may use an X.500 Directory System in addition to other repositories as deemed appropriate. The GPO CPS shall specify the location and contents of the repositories. The GPO-CA and its Operational Authority are responsible for the operation of all GPO-CA repositories.

### **2.2 PUBLICATION OF CERTIFICATE INFORMATION**

#### **2.2.1 Publication of Certificates and Certificate Status**

The GPO-CA shall utilize a set of redundant directory systems and Online Certificate Status Protocol (OCSP) servers to achieve high availability and meet the availability requirements of the federal PKI Common Policy. This is achieved both by on-site redundant directory systems at the primary GPO-CA site, as well as backup directory systems, including an always online OCSP server, at the off-site backup location for the GPO-CA.

The GPO-CA shall ensure that certificates and CRLs are available for retrieval 24 hours per day, 7 days per week, with a minimum of 99% availability overall per year and scheduled down-time not to exceed 0.5% annually. This is achieved via the use of the redundant directory systems, and Change Control and other GPO-CA procedures.

CA and End Entity certificates shall only contain valid Uniform Resource Identifiers (URIs) that are accessible by relying parties.

#### **2.2.2 Publication of CA Information**

The GPO OA shall publish a copy of the GPO CP via the GPO PKI web site (<https://www.gpo.gov/how-to-work-with-us/agency/services-for-agencies/public-key-infrastructure>).

### **2.2.3 Interoperability**

Certificates, CRL's and Certificate Status Servers of the GPO-SCA shall use standards based protocols, data structure, and directory schemas, to ensure that interoperability with the federal PKI infrastructure (the federal Common Policy and Federal Bridge CA) and relying parties is achieved.

## **2.3 TIME OR FREQUENCY OF PUBLICATION**

This CP and any approved changes are published within 30 days of approval by the GPO PA.

Publication requirements for CRLs are described in sections 4.9.7 and 4.9.12 of this CP.

Certificates are published in the directory as soon as they are issued. CRLs and ARLs are published in the directory as soon as they are issued.

The automated replication mechanism used internal to the Directory is configured to replicate any changes to the onsite redundant directory systems as soon the changes occur. Replication to the off-site backup Directory system shall occur periodically and not less than once per day.

## **2.4 ACCESS CONTROLS ON REPOSITORIES**

The GPO-CA shall protect any repository information not intended for public dissemination or modification. Directory system access control mechanisms shall be used for this. Public keys and certificate status information in the GPO-CA repository shall be publicly available through the Internet, which shall also facilitate availability to Federal relying parties.

### **3. IDENTIFICATION AND AUTHENTICATION**

#### **3.1 NAMING**

##### **3.1.1 Types of Names**

The GPO-CA asserting this CP (and when required the Subordinate CA) shall generate, sign and process certificates that contain an X.500 Distinguished Name (DN). Domain Component elements may be used in addition to the DN. Where DNs are required, subscribers shall have them assigned through their organizations, in accordance with a naming authority. If an X.500 Alternative Subject Name is used it must be marked non-critical. All CA and RA certificates shall have a non-null DN. All certificates issued to end entities shall include a non-NULL subject DN. The DN in all certificates shall accurately reflect organizational structure, and certificates for external agency DN's shall have the name of the agency involved in the DN. Certificates at all levels of assurance may include alternative name forms.

##### **3.1.2 Need for Names to be Meaningful**

The identity certificates issued pursuant to this CP are meaningful only if the names that appear in the certificates can be understood and used by Relying Parties. Names used in the certificates must identify the person or object to which they are assigned in a meaningful way.

When DNs are used, it is preferable that the common name represents the subscriber in a way that is easily understandable for humans. For people, this will typically be a legal name. For equipment, this may be a model name and serial number, or an application process (e.g., Organization X Mail List or Organization Y Multifunction Interpreter).

The GPO-CA shall use DNs in certificates it issues. In the case where a root CA certifies a subordinate CA, the GPO-CA must impose restrictions on the name space authorized in the subordinate CA, which are at least as restrictive as its own name constraints.

Cross certificates issued by the GPO-CA at the Medium Assurance level shall have name constraints excluding the GPO name space (i.e. certificates issued by non-GPO CAs under the GPO name space are not trusted) specified by the GPO Naming Authority.

When User Principal Names (UPN) are used, they must be unique and accurately reflect organizational structures.

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### **3.1.3 Anonymity or Pseudo-anonymity of Subscribers**

The GPO-CA shall not issue anonymous certificates. The GPO-CA can issue pseudonymous certificates that identify subjects by their organizational role. The GPO-CA shall not issue any CA certificate that is anonymous or pseudonymous.

### **3.1.4 Rules for Interpreting Various Name Forms**

Rules for interpreting name forms shall be contained in the applicable certificate profile and are established by the GPO-PA. Rules for interpreting distinguished name forms are specified in X.501. Rules for interpreting e-mail addresses are specified in [RFC 2822].

### **3.1.5 Uniqueness of Names**

Name uniqueness across the GPO-CA must be enforced. The GPO CAs and RAs shall enforce name uniqueness within the X.500 name space which they have been authorized. When other name forms are used, they too must be allocated such that name uniqueness across the GPO-CA is ensured.

The GPO shall document in its CPS:

- What name forms shall be used
- How the CAs and RAs will allocate names within the Subscriber community to guarantee name uniqueness among current and past Subscribers

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

The GPO PA shall investigate and if necessary recommend the correction for any trademark name collisions brought to its attention. The GPO PA will communicate resolutions to all interested parties. Consistent with Federal Policy, the GPO PKI CAs will not knowingly use trademarks in names unless the subject has the rights to use that name.

## **3.2 INITIAL IDENTITY VALIDATION**

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

In all cases where the party named in a certificate generates its own keys, then that party shall be required to prove possession of the private key that corresponds to the public key in the certificate request. For signature keys, this may be done by the entity using its private key to sign a value and providing that value to the GPO-CA. The GPO-CA or GPO Subordinate CA shall then validate the signature using the party's public key. The GPO-PA may allow other mechanisms that are at least as secure as those cited here.

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In the case where a key is generated directly on the party's token, or in a key generator that benignly transfers the key to the party's token, then the party is deemed to be in possession of the private key at the time of generation or transfer. If the party is not in possession of the token when the key is generated, then the token shall be delivered to the subject via an accountable method.

When keyed hardware tokens are delivered to certificate subjects, the delivery shall be accomplished in a way that ensures that the correct tokens and activation data are provided to the correct subjects. The GPO must maintain a record of validation for receipt of the token by the subject. When any mechanism that includes a shared secret is used, the mechanism shall ensure that the applicant and the GPO-CA are the only recipients of this shared secret.

### **3.2.2 Authentication of Organization Identity**

Requests for GPO-CA certificates in the name of an organization shall include the organization name, address, and documentation of the existence of the organization. The GPO-OA or GPO-RA shall verify the information, in addition to the authenticity of the requesting representative and the representative's authorization to act in the name of the organization.

### **3.2.3 Authentication of Individual Identity**

Identity shall be authenticated, as described in the sub-sections below, depending on the type of Subscriber involved. There are different classifications of Subscribers and the initial registration process differs accordingly; however, all Subscribers are responsible for providing identity-proofing credentials as part of the initial registration process. A certificate shall be issued to a single end entity.

#### **3.2.3.1 Authentication of Human Subscribers**

For Subscribers, the Officer role (RAs and Security Officers) for the GPO-CA shall ensure that the applicant's identity information is verified and checked in accordance with the GPO CP and CPS. The GPO-RA shall ensure that the applicant's identity information and public key are properly bound. Additionally, the GPO-RA shall record the process that was followed for issuance of each certificate. The process documentation and authentication requirements shall include the following:

- The identity of the person performing the identification
- A signed declaration by that person, using the format set forth at 28 U.S.C. 1746 (declaration under penalty of perjury), that he or she verified the identity of the Subscriber as required by the applicable certificate policy
- A unique identifying number from the ID of the verifier and, if in-person or supervised remote identity proofing is done, from the ID of the applicant (NOTE: The minimum requirements associated with supervised remote identity proofing are described in NIST SP 800-63A, Digital Identity Guidelines: Enrollment and Identity Proofing, Section 5.3.3)
- The date and time of the verification

- A declaration of identity signed by the applicant using a handwritten signature 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).

Identity for all human subscribers is established by in-person appearance before the Registration Authority,

Credentials required are either one Federal Government-issued Picture I.D., or two Non-Federal Government I.D.s, one of which shall be a photo I.D.

If an Applicant is unable to perform either in-person face-to-face registration alone (e.g., a network device), the applicant shall be represented by a human sponsor or trusted agent already issued a digital certificate by the GPO-CA. The human sponsor or trusted agent will present information sufficient for registration of the certificate being requested, for both himself/herself and the applicant who the trusted person is representing.

**For the Medium Assurance Levels:** Identity shall be established no more than 30 days before initial certificate issuance. 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. The certified entity forwards the information collected from the applicant directly to the RA 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 of its responsibility to verify the presented data.

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

Assurance Level	Identification Requirements
Medium (all policies)	Identity shall be established by in-person appearance before the Registration Authority, Trusted Agent or an entity certified by a State or Federal Entity as being authorized to confirm identities; information provided shall be verified to ensure legitimacy. A trust relationship between the Trusted Agent and the applicant which is based on an in-person antecedent identity proofing meeting the in-person identity proofing requirement. Credentials required are Federal Government-issued Picture I.D., one REAL ID Act compliant picture ID, or two Non-Federal Government I.D.s, one of which shall be a photo I.D. Any credentials presented must be unexpired. Clarification on the trust relationship between the Trusted Agent and the applicant, which is based on an in-person antecedent identity proofing

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	event, can be found in the <i>FBCA Supplementary Antecedent, In-Person Definition</i> document.
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In the event an applicant is denied a credential based on the results of the identity proofing process, the GPO-CA shall provide a mechanism for appeal or redress of the decision.

### **3.2.3.1.1 Authentication for Role Based Certificates**

There is a subset of human subscribers who may be issued role-based certificates. These certificates will identify a specific role on behalf of which the subscriber is authorized to act rather than the subscriber's name and are issued in the interest of supporting accepted GPO and external agency 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. A specific role may be identified in certificates issued to multiple subscribers, however, the key pair will be unique to each individual role-based certificate. Roles for which role-based certificates may be issued are limited to those that uniquely identify a specific individual within an organization. Role-based certificates shall not be shared, but shall be issued to individual subscribers and protected in the same manner as individual certificates.

The GPO-CA shall record the information identified in Section 3.2.3.1 for a sponsor associated with the role before issuing a role-based certificate. The sponsor must hold an individual certificate in his/her own name issued by the GPO-CA at the same or higher assurance level as the role-based certificate.

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

For pseudonymous certificates that identify subjects by their organizational roles, the GPO-CA shall validate that the individual either holds that role or has been delegated the authority to sign on behalf of the role.

### **3.2.3.2 Authentication of Devices**

Some computing and communications components (routers, firewalls, servers, etc.) will be named as certificate subjects. In such cases, the component must have a human sponsor. The Sponsor is responsible for providing the following registration information:

- Equipment identification or service name
  - i) serial number (for devices)
  - ii) DNS and/or host name (for servers or components)
- Equipment public keys

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- Equipment 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

The registration information shall be verified to an assurance level commensurate with the certificate assurance level being requested. Acceptable methods for performing this authentication and integrity checking include, but are not limited to:

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

Identification and authentication of the human sponsor follows Section 3.2.3.1 as if the sponsor were applying for a certificate on their own behalf. In addition, the RA will verify the authority of the sponsor to receive certificates for that component (device) or server. The authority of the sponsor to receive device or server certificates is defined to be those personnel identified for this purpose in the agency's MOA with GPO, or by digitally signed message from those personnel in the MOA.

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

Normally, a certificate shall be issued to a single Subscriber. For cases where there are several entities acting in one capacity, and where non-repudiation for transactions is not desired, a certificate may be issued that corresponds to a private key that is shared by multiple Subscribers. The GPO RA shall record the information identified in Section 3.2.3.1 for a sponsor from the GPO IT Security office before issuing a group certificate.

In addition to the authentication of the sponsor, the following procedures shall be performed for members of the group:

- The GPO IT Security office shall be responsible for ensuring control of the private key, including maintaining a list of Subscribers who have access to use of the private key, and accounting for which Subscriber had control of the key at what time.
- The subjectName DN must not imply that the subject is a single individual, e.g. by inclusion of a human name form;
- The list of those holding the shared private key must be provided to, and retained by, the applicable CA or its designated representative; and
- 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).

### **3.2.4 Non-Verified Subscriber Information**

Only verified information (verified by the RA or CA personnel) shall be included in certificates.

### **3.2.5 Validation of Authority**

Before issuing a certificate that asserts organizational identity, the GPO-CA shall validate that the subscriber (applicant) has the authority to act in the requested capacity. For pseudonymous certificates that identify subjects by their organizational role, the CA shall validate that the individual holds this role or has been delegated the authority to act or sign on behalf of that role.

### **3.2.6 Criteria for Interoperation**

The GPO PA shall determine the criteria for cross certification with other Entities in accordance with Section 1.1.5 and the U.S. Government Federal Public Key Infrastructure (FPKI) requirements. Under no circumstances shall any certificate have more than one (1) intentional trust path to the FBCA, irrespective of extension processing.

(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**

The GPO-CA Trusted Role and Subscriber keys shall be automatically updated prior to expiration of the current key pairs. If more than nine (9) years have passed since the subscriber's identity was verified via in-person proofing (the procedures of section 3.2.3.1 above), then the certificate re-key shall require the same user identification proofing as certificate issuance.

In the event that GPO-CA re-key is required, the GPO-CA will seek to exchange new cross certificates with the FBCA. For any subordinate GPO PKI CA that requires a re-key, the GPO-CA will issue its new certificate. Before issuance, the subordinate CA shall identify itself through use of its current signature key or the initial registration process. If it has been more than three years since the subordinate CA identification, as required in Section 3.2, the GPO PKI subordinate CA shall re-establish identity through the initial registration process.

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

For device certificates, identity may be established through the use of the device's current signature key or the signature key of the device's human sponsor, except that identity shall be established through the initial registration process at least once every nine years from the time of initial registration

The GPO-CA shall determine when certificate re-key operations will exceed the nine (9) year limitation and therefore prevent the automatic re-key and require the subscriber to present

themselves in person for identity proofing per section 3.2.3.1 above. The CA performs a procedure described in detail in the CPS to accomplish this, which includes the following aspects.

- a. A listing is created periodically that lists all Subscribers who will pass the 9 year mark within a certain lead time range.
- b. All Subscribers on this list are sent an email informing them that they must present themselves for in-person identity proofing prior to the lead time expiring.
- c. The listing also shows any Subscribers that are active that have passed the 9 year mark, and thus in theory could have an automatic re-key performed. These Subscribers have their certificate revoked by the RA, and an email is sent to the user informing them that their certificate has been revoked and they must present themselves for in-person identity proofing (per section 3.2.3.1 above) to obtain another certificate or to have key recovery performed.

Subscribers of GPO PKI (CA) shall identify themselves for the purpose of re-keying as required below:

<b>Assurance Level</b>	<b>Routine Re-key Identity Requirements for Subscriber Signature and Encryption Certificates</b>
Medium (all policies)	Subscriber may establish identity through use of current signature key, except that the Subscriber shall re-establish identity through initial registration process at least once every nine years from the time of initial registration.  For Device certificates, identity may be established through the use of current signature key or using means commensurate with the strength of the certificate being requested, except that identity shall be established through initial registration process at least once every nine years from the time of initial registration.

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

All GPO-CA Subscribers or human sponsors (in the case of device certificates) must repeat the initial certificate registration and request process, and the initial identify proofing process, in accordance with section 3.2 above, in order to obtain a new certificate after a revocation.

### **3.4 IDENTIFICATION AND AUTHENTICATION FOR REVOCATION REQUEST**

Revocation requests must be authenticated. Requests to revoke a certificate may be authenticated using that certificate's associated private key, regardless of whether or not the private key has been compromised.

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## **4. CERTIFICATE LIFE-CYCLE OPERATIONAL REQUIREMENTS**

### **4.1 CERTIFICATE APPLICATION**

The following steps are required of a subscriber when applying for a GPO certificate:

- Establish need for certificate
- Establish identity of subscriber
- Obtain public and private key pairs for each certificate required
- Prove to the RA or CA that the Public key forms a functioning key pair with the private key that is held by the subscriber
- Provide a point of contact for verification of any roles or authorizations requested

CAs asserting to this CP shall certify Entity CAs (to include cross certification) only as authorized by the GPO-PA. For this CP at this time, the only Entity CA the GPO CA has an interoperability relationship and requirement for is the Federal PKI Trust Infrastructure, including the Federal Bridge CA (FBCA).

#### **4.1.1 Who Can Submit a Certificate Application**

##### **4.1.1.1 CA Certificates**

For the GPO-CA, the GPO PA or OA shall submit the certificate application to the FPKIPA (for cross-certification to the FBCA). For subordinate GPO PKI CAs, the GPO PKI entity shall submit requests for subordinate GPO PKI CA certificates to the GPO PA. An application for a CA certificate shall be submitted by an authorized representative for the applicant CA.

##### **4.1.1.2 User Certificates**

An application for a user (subscriber) certificate shall be submitted by either the subscriber themselves, or by a trusted agent.

### **4.1.1.3 Device Certificates**

An applicant for a device certificate shall be the human sponsor for the device.

## **4.1.2 Enrollment Process and Responsibilities**

All communications between PKI authorities and other participants shall be protected from modification and authenticated; electronic communication of shared secrets shall be protected. Communications may be electronic or out-of-band. Where electronic communications are used, cryptographic mechanisms shall be used that are equivalent in strength to the public/private key pair involved. Out-of-band mechanisms shall protect the confidentiality and integrity of the information.

## **4.2 CERTIFICATE APPLICATION PROCESSING**

### **4.2.1 Performing Identification and Authentication Functions**

For the GPO-CA, the GPO PA and OA shall validate acceptance of applicant identification and authentication.

For subordinate GPO PKI 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. If databases or other sources are used to confirm Subscriber attributes, then these sources and associated information sent to a CA shall require:

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

The GPO OA and RA's shall authenticate and protect from modification all communications supporting the certificate application and issuance process using mechanisms commensurate with the protection requirements of the data. The GPO OA and RA's shall protect from unauthorized disclosure any electronic transmission of this data (i.e., encryption) commensurate with the protection requirements of the data.

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## **4.2.2 Approval or Rejection of Certificate Applications**

Approval or rejection of certificate applications is at the discretion of the GPO PA or the PA's designee. The GPO PKI PA, OA and RAs/LRAs may reject any Subscriber, group, or component application that is incomplete, or that contains information that they cannot verify as accurate in accordance with Section 4.2.1. The GPO OA and RA's may afford Subscribers and Sponsors the opportunity to complete and/or augment application information. Failure to do so will result in rejection of the certificate application and denial of PKI certificate issuance.

## **4.2.3 Time to Process Certificate Applications**

Certificate applications must be processed and a certificate issued within 30 days of identity verification.

## **4.3 ISSUANCE**

Upon receiving a request for a certificate, the GPO-CA authorized trusted role staff or RA shall respond in accordance with the policy requirements listed below.

### **4.3.1 CA Actions during Certificate Issuance**

Upon receiving a valid request, the CA/RA shall:

- Verify the identity of the requestor
- Verify the authority of the requestor and the integrity of the information in the certificate request
- Build and sign a certificate if all certificate requirements have been met
- Make the certificate available to the subscriber upon verifying that the subscriber has acknowledged their obligations

The GPO-CA does not sign the certificate until all identify verification and authentication procedures described in the section 3.2 and 3.3 above in the GPO-CA CP, and procedures described in the GPO-CA CPS, are completed. The responsibility for verifying prospective subscriber information shall be described in greater detail in the GPO-CA CPS.

It is the responsibility of the GPO RA to verify that the certificate information is correct and accurate. The GPO OA and RA shall check all CA certificates to ensure that all fields and extensions are properly populated. The GPO CA shall not sign any certificate until the RA and/or LRA have

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completed all verifications and modifications, if any, to the GPO CA's satisfaction, and the identification and authentication process set forth in the GPO CP and GPO CPS are complete. If an RA or LRA denies a certificate request, then the CA shall not sign the requested certificate.

#### **4.3.2 Notification to Subscriber of Certificate Issuance**

The GPO-CA shall inform the Subscriber (or subject of the certificate) of the creation of the certificate and shall make the certificate available to the Subscriber. For device certificates, the human sponsor shall be informed by the GPO-CA.

### **4.4 CERTIFICATE ACCEPTANCE**

A Subscriber shall be required to sign, using a handwritten signature, a document containing the requirements the Subscriber shall meet respecting protection of the private key and use of the certificate before being issued the certificate. The document shall contain the following requirements at a minimum:

- The Subscriber shall accurately represent themselves in all communications with the PKI authorities and other Subscribers.
- The Subscriber shall notify, in a timely manner, the CA that issued their certificates of suspicion that their private keys are compromised or lost, in the event that occurs.

#### **4.4.1 Conduct Constituting Certificate Acceptance**

Failure to object to the certificate or its contents constitutes acceptance of the certificate.

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

The GPO-CA shall publish Subscriber certificates into the GPO-CA Repository per section 2 of this CP, and also in accordance with section 9.4.3. The GPO-CA certificate shall be available in the GPO-CA Repository per section 2 of this CP.

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

The Federal PKI Policy Authority (FPKIPA) shall be notified by the GPO PA at least two (2) weeks prior to the issuance of new CA certificate or issuance of new inter-organizational CA cross-certificates. In addition, all new artifacts (CA certificates, CRL DP, AIA and/or SIA URLs, etc.) produced as a result of the CA certificate issuance shall be provided to the FPKIPA within

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24 hours following issuance. The notification shall assert that the new CA cross-certification does not introduce multiple paths to a GPO CA already participating in the FPKI.

## **4.5 KEY PAIR AND CERTIFICATE USAGE**

### **4.5.1 Subscriber Private Key and Certificate Usage**

Subscribers shall protect their private keys from access by other parties. Restrictions in the intended scope of usage for the private key and associated certificate shall be specified through the use of certificate extension fields, including the key usage and extended key usage extension contained in issued certificates.

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

GPO-CA certificates issued to subordinate and cross certified CAs, shall specify restrictions on use through critical certificate extensions, including the key usage extensions. Basic constraints may also appear if set to critical in accordance with the FPKI-PROF. Certificates issued under this CP shall make use of certain critical extensions, including key usage and basic constraints, which relying parties are recommended to process and make use of in determining appropriate relying party use of GPO-CA issued certificates. In addition, the GPO-CA shall make available via the CRL and CSS service the status of certificates to relying parties, which relying parties are recommended to use in determining how to make use of any GPO-CA issued certificate.

## **4.6 CERTIFICATE RENEWAL**

Renewing a certificate means creating a new certificate with the same name, key, and other information as the old one, but a new, extended validity period and a new serial number. Certificates may be renewed in order to reduce the size of CRLs. A certificate may 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 renewed certificate must meet the requirements specified in Section 6.3.2.

After certificate renewal, the old certificate may or may not be revoked, but must not be further re-keyed, renewed, or modified.

#### **4.6.1 Circumstance for Certificate Renewal**

Subscriber keys shall not be renewed except in situations of recovery from a CA key compromise (which will entail a CA re-key). Certificates may also be renewed when a CA re-keys

#### **4.6.2 Who May Request Renewal**

For all subordinate CA's and OCSP Responders operating under this policy, the GPO-CA Operating Authority may request renewal of the GPO CA or OCSP certificate. After certificate renewal, the old certificate may or may not be revoked, but must not be further re-keyed, renewed, or modified. Additionally, a GPO PKI CA may perform renewal of its Subscriber certificates without a corresponding request when the CA re- keys.

#### **4.6.3 Processing Certificate Renewal Requests**

Not applicable since the GPO-CA only supports certificate renewal in cases of CA re-key.

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

The CA shall notify the Subscriber of certificate renewal along with the content of the renewed certificate.

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

Failure to object to the certificate or its contents constitutes acceptance of the certificate.

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

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All CA certificates shall be published in a GPO-CA repository as specified in section 2 above.

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

Not applicable.

### **4.7 CERTIFICATE RE-KEY**

Re-keying a certificate means that a new certificate is created 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 it may be assigned a different validity period. Re-key of a certificate does not require a change to the subjectName and does not violate the requirement for name uniqueness.

New certificates will need to be issued to GPO Subordinate CAs by the GPO-CA when the GPO-CA re-keys. Upon re-key of this component, the GPO-CA shall identify and authenticate subscriber either by:

- (a) Performing the identification process defined in Section 3.1, or
- (b) If it has been less than three years since a GPO Subordinate CA was identified as required in Section 3.1, using the currently valid certificate issued to the subscriber by the GPO-CA.

Subscribers of the GPO-CA shall identify themselves for the purpose of re-keying. The identity may be established through use of current signature key, except that identity shall be established through initial registration process at least once every nine (9) years from the time of initial registration.

After certificate rekey, the old certificate may or may not be revoked, but must not be further re-keyed, renewed, or modified.

#### **4.7.1 Circumstance for Certificate Re-key**

The longer and more often a key is used, the more susceptible it is to loss or discovery. Therefore, it is important that a Subscriber periodically obtains a new key. Examples of circumstances that require re-key include certificate expiration, compromise or loss, and issuance of a new hardware token.

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

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Subscribers with a current, valid certificate may request re-key via a digitally signed message. CA's and RA's may request certification of a new public key on behalf of a subscriber. For device certificates, the human sponsor may request certification of a new public key for the device. Additionally, CAs and RAs may initiate re-key of a Subscriber's certificates without a corresponding request (such as during a CA re-key).

#### **4.7.3 Processing Certificate Re-keying Requests**

Digital signatures shall be validated on electronic re-key requests from subscribers. Alternatively, re-key requests may be validated using the procedures for subscriber identity and authentication for initial certificate issuance (section 3.2 above) or for re-key (section 3.3 above).

Before performing re-keys on cross-certified or subordinate CAs, the GPO PKI OA and RA shall identify and authenticate the Principal CA by performing the identification processes defined in Section 3.2 or 3.3 above. The validity period associated with the new certificate must not extend beyond the period of the MOA in the case of the cross-certified CA.

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

The GPO OA shall notify subordinate GPO PKI CAs and cross certified Entity Principal CAs, including the FPKI for the FBCA, upon issuance of new CA certificates. The GPO-CA shall notify the Subscriber of certificate re-key along with the content of the rekeyed certificate.

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

Failure to object to the certificate or its contents constitutes acceptance of the certificate.

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

CA certificates shall be published as required in section 2 of this CP. For subscriber certificates, there are no stipulations except for section 9.4.3 of this CP.

#### **4.7.7 Notification of Certificate Issuance by the CA to Other Entities**

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For the GPO-CA, the GPO PA or OA shall provide notification to all subordinate GPO PKI CA's and cross certified entities, including the FPKIPA upon issuance of re-keyed inter-organizational CA cross certificates.

## **4.8 CERTIFICATE MODIFICATION**

Updating a certificate means creating a new certificate that has the same or a different key and a different serial number, and that it differs in one or more other fields, from the old certificate. For example, GPO-SCA may choose to update a certificate of a Subscriber whose characteristics have changed (e.g., name change due to marriage). The old certificate shall always be revoked, and therefore cannot be further re-keyed, renewed, or updated.

Further, if an individual's name changes (e.g., due to marriage), then proof of the name change must be provided to the RA or other designated agent in order for an updated certificate having the new name to be issued. The new certificate shall have a new public key for cases in which an individual's name changes.

### **4.8.1 Circumstance for Certificate Modification**

The GPO-CA may modify a GPO CA or OCSP certificate whose characteristics have changed, for instance, to assert a new policy OID. The new certificate may contain the same public key or a new public key.

The GPO-CA may modify a subscriber's certificate due to a characteristic change of the subscriber (name change due to marriage, for example). The modified certificate shall contain a different public key.

### **4.8.2 Who May Request Certificate Modification**

Subscribers with a current, valid certificate may request certificate modification via a digitally signed message. CA's and RA's may request certificate modification on behalf of a subscriber. For device certificates, the human sponsor may request certificate modification for the device.

### **4.8.3 Processing Certificate Modification Requests**

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If the subscriber's name has changed (for example, due to marriage), then the subscriber shall provide proof of the name change to the RA or trusted agent before the certificate modification is processed.

Proof of all subject information changes shall be provided to the RA or trusted agent before the modified certificate can be issued.

For the GPO-CA CA certificate, the GPO OA shall perform certificate modification in coordination with the GPO PA and also coordinate with the FPKI. The validity period associated with the CA new certificate must not extend beyond the period of the MOA with the FPKI and FBCA, and the Security Officer must verify the information before the CA issues the modified certificate.

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

The GPO OA shall notify subordinate GPO PKI CAs and cross certified Entity Principal CAs (including the FPKI for the FBCA) upon issuance of new CA certificates. The GPO-CA shall notify the Subscriber of certificate renewal along with the content of the renewed certificate.

#### **4.8.5 Conduct Constituting Acceptance of Modified Certificate**

Failure to object to the certificate or its contents constitutes acceptance of the certificate.

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

CA certificates shall be published as required in section 2 of this CP. For subscriber certificates, there are no stipulations except for section 9.4.3 of this CP.

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

For the GPO-CA, the GPO PA or OA shall provide notification to all subordinate GPO PKI CA's and cross certified entities, including the FPKIPA upon issuance of re-keyed inter-organizational CA cross certificates.

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## 4.9 CERTIFICATE SUSPENSION AND REVOCATION

Revocation requests must be authenticated by the GPO OA or RA. Requests to revoke a certificate may be authenticated using that certificate's associated private key, regardless of whether or not the private key has been compromised. For Medium Hardware and Medium Assurance, all GPO PKI CAs shall publish CRLs.

The FPKIPA shall be notified by the GPO PA at least two (2) weeks prior to the revocation of a CA certificate, whenever possible. For emergency revocation, the GPO CA shall follow the notification procedures in Section 5.7.

### 4.9.1 Circumstances for Revocation

The GPO OA will revoke certificates issued by the GPO-CA under three circumstances:

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

A certificate shall be revoked when the binding between the subject and the subject's public key contained within a certificate is no longer considered valid. Examples of circumstances that invalidate the binding include:

- Identifying information in the certificate has become invalid
- The Subscriber or CA can be shown to have violated, or is suspected of violating, the requirements of the GPO CP, or MOA
- The private key has been or is suspected of having been compromised, or has been lost, stolen, or destroyed in a fashion where there is potential for compromise or loss of control over the use of the private key

For Certificates that express an organizational affiliation, the GPO OA shall require that the organization must inform the GPO OA of any changes in the subscriber affiliation. If the affiliated organization no longer authorizes the affiliation of a Subscriber, the GPO OA shall revoke any certificates issued to that Subscriber containing the organizational affiliation. If an organization terminates its relationship with the GPO-CA such that it no longer provides affiliation information, the GPO OA shall revoke all certificates affiliated with that organization.

Additionally, a Subscriber may always request the revocation of his or her certificate directly. Whenever any of the above circumstances occur, the associated certificate shall be revoked and placed on the CRL. Revoked certificates shall be included on all new publications of the certificate status information at least until the certificates expire.

#### **4.9.2 Who Can Request Revocation**

A GPO-CA issued certificate may be revoked at the direction of the GPO-PA, or an authenticated request by the RA, subscriber, or a designated official. (The designated official shall be identified and authorized in the GPO CP, CPS, or MOA to make such a request.)

The process for requesting revocation of a Subscriber certificate issued by the GPO-CA shall be set forth in detail in the GPO CPS. Revocation normally will proceed once:

- The GPO-CA receives sufficient evidence of compromise or loss of the subscriber's corresponding private key
- An authenticated request is made to the GPO-CA by the holder of the private key (the Subscriber)
- Someone in his or her supervisory chain, or an officially designated administrative or information security officer, makes an authenticated request for revocation

#### **4.9.3 Procedure for Revocation Request**

A request to revoke a certificate shall identify the certificate to be revoked, explain the reason for revocation, and allow the request to be authenticated (e.g., digitally or manually signed). Only the GPO-PA may direct the GPO-OA to revoke certificates issued by the GPO-CA.

Authentication of certificate revocation requests is important to prevent malicious revocation of certificates by unauthorized parties. In particular, if the revocation is being requested for reason of key compromise or suspected fraudulent use, then the Subscriber's or the RA's revocation request must so indicate. If a RA performs this on behalf of a Subscriber, a formal, signed message format known to the CA shall be employed. All requests shall be authenticated; for signed requests from the certificate subject, or from an RA, verification of the signature is sufficient.

Upon receipt of a revocation request involving a GPO-CA issued certificate, the GPO-OA shall authenticate the request and apprise the GPO-PA. The GPO-PA may, at its discretion, take whatever measures it deems appropriate to verify the need for revocation. If the revocation request appears to be valid, the GPO-PA shall direct the GPO-CA to revoke the certificate by

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placing its serial number and other identifying information on a CARL/CRL and then post the CARL/CRL in the GPO-CA repository, in addition to any other revocation mechanisms used. The GPO-PA at its discretion may set forth emergency procedures for the GPO-CA to use to effect immediate revocation of a certificate issued by the GPO-CA when appropriate.

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 shall be revoked or shall be verified as appropriately issued.

For PKI implementations using hardware tokens, a Subscriber ceasing its relationship with an organization that sponsored the certificate shall, prior to departure, surrender to the organization (through any accountable mechanism) all cryptographic hardware tokens that were issued by or on behalf of the sponsoring organization. If a Subscriber leaves an organization all the Subscriber's certificates shall be immediately revoked. The token shall be zeroized or destroyed upon, surrender and shall be protected from malicious use between surrender and zeroization or destruction.

If it is determined that revocation is required, the associated certificate shall be revoked and placed on the CRL. Revoked certificates shall be included on all new publications of the certificate status information until the certificates expire.

If a revocation is due to a certificate or systems compromise or the GPO Principal CA (PCA) violation of the Memorandum of Agreement with the FPKIPA, the GPO Policy Authority and/or GPO PKI Operational Authority representatives shall notify the FPKIMA. (NOTE: Per the FBCA CP, the FPKIMA will notify previously designated officials in all entities having a Principal CA with which the FBCA interoperates.)

#### **4.9.4 Revocation Request Grace Period**

There is no grace period for revocation requests. The GPO-CA shall revoke certificates upon request as quickly as is practical. Revocation requests shall be processed and the CRL updated as quickly as practical. GPO-CA and GPO PKI CA's will revoke certificates as quickly as practical upon receipt of a proper revocation request, and shall always revoke certificates within the time constraints described in Section 4.9.5.

#### **4.9.5 Time within which CA must Process the Revocation Request**

The GPO-CA shall revoke certificates as quickly as practical after a valid revocation request is received. Revocation requests shall be processed before the next CRL is published, excepting those requests which are received within two (2) hours of CRL publication. Revocation requests received within two (2) hours of CRL issuance shall be processed before the following CRL is published. A request is considered received when a GPO PKI Trusted Role staff member authorized to revoke certificates, first accesses a valid request.

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#### 4.9.6 Revocation Checking Requirements for Relying Parties

This CP makes no stipulation upon Relying Parties. Use of revoked certificates could have damaging or catastrophic consequences. The matter of how often new revocation data should be obtained is a determination to be made by the Relying Party, considering the risk, responsibility, and consequences for using a certificate whose revocation status cannot be guaranteed.

#### 4.9.7 CRL Issuance Frequency

CRLs shall be issued in accordance with the following frequency requirements:

- A GPO CA that only issue certificates to other CAs and that operate off-line (such as the GPO Principal CA, or PCA) must issue CRLs at least once every 31 days, and the nextUpdate time in the CRL may be no later than 32 days after issuance time (i.e., the thisUpdate time).
- GPO CAs that issue certificates to subscribers or operate on-line (such as the GPO Subordinate CA, or SCA) 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).

CRLs shall be issued periodically, even if there are no changes to be made, to ensure timeliness of information.

The GPO PCA may be operated in an offline manner since the GPO PCA only issues:

- CA certificates
- CSS certificates, and
- end user certificates solely for the administration of the principal CA.

Certificate status information may be issued more frequently than the issuance frequency described above. CRLs shall be issued within 18 hours of notification of loss or compromise of private key. The GPO-CA shall ensure that superseded certificate status information is removed from the repository upon posting of the latest certificate status information.

Certificate status information shall be published not later than the next scheduled update. This will facilitate the local caching of certificate status information for off-line or remote (laptop) operation. The GPO shall coordinate with the repositories to which they post certificate status information to reduce latency between creation and availability.

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Practice Note: Since many applications only check for a new CRL at nextUpdate, a longer nextUpdate time may result in applications continuing to rely on older CRLs even when a newer CRL is available. A longer nextUpdate time also increases the potential of a replay attack to validate a newly revoked certificate. Where the CRL nextUpdate exceeds 48 hours, Relying Parties should consider these risks and take appropriate measures to mitigate the risk. For high-risk, sensitive Relying Party applications suggested measures include configuring a preference for OCSP by applications, pre-fetching CRLs at least every 18 hours, and use of other compensating controls.

#### **4.9.8 Maximum Latency for CRLs**

CRL's shall be published within four (4) hours of generation. Each CRL is published with the *nextUpdate* time specified in the previous CRL for the same scope.

#### **4.9.9 On-line Revocation/Status Checking Availability**

The GPO-CA shall support, in addition to CARL/CRLs, on-line status checking via the On-line Certificate Status Protocol (OCSP). Client software using on-line status checking need not obtain or process CARL/CRLs.

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

#### **4.9.10 On-line Revocation Checking Requirements**

This is not applicable. The GPO-CA provides OCSP capability for Relying Parties to check on certificate status. Relying Parties (clients) using online revocation checking need not obtain or process CRLs, at their own discretion.

#### **4.9.11 Other Forms of Revocation Advertisements Available**

Not applicable. There are no other forms of revocation advertisements available from the GPO-CA (other than the CRL and OCSP methods required and described above in section 4.9).

#### **4.9.12 Special Requirements Related To Key Compromise**

In the event of a GPO-CA private key compromise (confirmed or suspected) or loss, all issued cross certificates shall be revoked (including to the FPKI FBCA) and a CRL shall be published at the earliest feasible time by the GPO OA.

In the event of a GPO-CA private key compromise (confirmed or suspected) or loss, or Subscriber certificate is revoked because of compromise or suspected compromise, the GPO-CA shall publish a CARL and CRL within 18 hours of notification to the GPO-CA.

#### **4.9.13 Circumstances for Suspension**

Suspension shall not be used by the GPO-CA.

#### **4.9.14 Who Can Request Suspension**

Suspension is not permitted by the GPO-CA, therefore this is not applicable.

#### **4.9.15 Procedure for Suspension Request**

Suspension is not permitted by the GPO-CA, therefore there is no procedure for suspension request.

#### **4.9.16 Limits on Suspension Period**

Suspension is not permitted by the GPO-CA, therefore this is not applicable.

### **4.10 CERTIFICATE STATUS SERVICES**

#### **4.10.1 Operational Characteristics**

The GPO-CA shall provide CSS service via an online OCSP Responder in accordance with federal PKI FBCA and Common Policy requirements and standard protocols.

#### **4.10.2 Service Availability**

The CSS for the GPO-CA shall be available online and shall have an off-site backup system that is also online to provide operational resiliency and high availability to meet all federal PKI requirements.

#### **4.10.3 Optional Features**

Not applicable.

#### **4.11 END OF SUBSCRIPTION**

Not applicable.

#### **4.12 KEY ESCROW AND RECOVERY**

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

CA keys are never escrowed.

Signature keys, including any Subscriber private dual use keys, are never escrowed.

Subscriber dual use keys shall never be escrowed.

GPO has adopted the Federal PKI (FPKI) Key Recovery Policy and has developed a GPO Key Recovery Practices Statement (GPO KRPS) which is incorporated by reference into the GPO-CA CPS document for Subscriber key management keys, which are available for key recovery using key escrow, and using the practices in the GPO-CA CPS which includes a GPO Key Recovery

Practice Statement (KRPS). The GPO-CA shall protect escrowed keys at no less than the level of security appropriate to the assurance level of the certificate.

Under no circumstances will the GPO-CA or a third party hold a GPO-CA Subscriber signature key in trust.

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

The GPO-CA does not offer or perform this service/function and this is not applicable.

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## **5. FACILITY, MANAGEMENT AND OPERATIONAL CONTROLS**

### **5.1 PHYSICAL CONTROLS**

All GPO PKI CA equipment, including CA cryptographic modules, shall be protected from unauthorized access at all times. The GPO-CA shall impose physical security requirements that provide similar levels of protection as those specified below. All the physical control requirements apply equally to the GPO-CA and all subordinate CA's.

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

The GPO-CA equipment shall be in a controlled facility that is monitored 24 hours per day, 7 days per week, 52 weeks per year. The GPO-CA cryptographic modules, both those active and operational, and those stored in security containers for on-site and off-site backup, shall be protected against theft, loss, and unauthorized use by the controls specified in section 5.1.2 below.

#### **5.1.1 Site Location and Construction**

The location and construction of the facility housing the GPO-CA equipment shall 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 and intrusion sensors, shall provide robust protection against unauthorized access to the GPO-CA equipment and records.

#### **5.1.2 Physical Access**

The GPO-CA equipment shall always be protected from unauthorized access, and especially while the cryptographic module is installed and activated. Physical access controls shall be implemented to reduce the risk of equipment tampering even when the cryptographic module is not installed and activated.

##### **5.1.2.1 Physical Access for CA Equipment**

The CA equipment is located in a secure PKI facility (at both the primary site and off-site backup location) which provides extensive controls over physical access.

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Physical access controls and procedures shall be implemented to:

- Ensure no unauthorized access to the CA hardware is permitted
- Ensure all removable media and paper containing sensitive plain-text information is stored in secure containers so as to ensure all GPO-CA media is protected from unauthorized physical access
- electronically monitor for unauthorized intrusion at all times
- Ensure an access log is maintained and inspected periodically
- Require via technical enforcement two-person physical access control to both the cryptographic module and computer system

An integrated physical access control and intrusion detection system shall be operational to restrict access to authorized personnel, to detect unauthorized access, and to provide for the audit of all entries to and exits from the controlled areas. Sensors shall be operational to monitor exit and entrance doors.

Removable cryptographic modules shall be inactivated prior to storage. When not in use, removable cryptographic modules, activation information used to access or enable cryptographic modules and GPO-CA equipment shall be placed in secure containers. Activation data shall either be memorized, or recorded and stored in a manner commensurate with the security afforded the cryptographic module, and shall not be stored with the cryptographic module.

A security check of the facility housing the GPO-CA equipment shall occur if the facility is to be left unattended. At a minimum, the check shall verify the following:

- The equipment is in a state appropriate to the current mode of operation
- Any security containers are properly secured
- Physical security systems (e.g., door locks, vent covers) are functioning properly
- The area is secured against unauthorized access

A person or group of persons shall be made explicitly responsible for making such checks. When a group of persons is responsible, a log identifying the person performing a check at each instance shall be maintained. If the facility is not continuously attended, both of the last two authorized personnel, to depart, will perform the check together, and both shall initial a sign-out sheet that indicates the date and time, and asserts that all necessary physical protection mechanisms are in place and activated.

### **5.1.2.2 Physical Access for RA Equipment**

Registration Authority equipment shall be protected from unauthorized access while the cryptographic module is installed via the password required for all RA tokens, which are

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required to be FIPS 140 Level 2 compliant hardware tokens. Only the authorized user can access the cryptographic module for RA operations, and the RA shall ensure that no other party uses the RA equipment while the RA is logged in. The RA user shall ensure that the Level 2 hardware token is controlled at all times, by having the token in the RA's possession or in a locked cabinet/desk.

### **5.1.2.3 Physical Access for CSS Equipment**

The CSS equipment shall be located in the same secure PKI facility as the CA equipment (at both the primary and off-site backup location), which shall provide the same controls as to the CA equipment.

### **5.1.3 Power and Air Conditioning**

The GPO-CA shall 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. The directories (containing CA issued certificates and CARLs) shall be provided with uninterrupted power sufficient for a minimum of six (6) hours of operation in the absence of commercial power.

### **5.1.4 Water Exposures**

The GPO-CA and CSS equipment shall be installed such that it is not in danger of exposure to water. This requirement excludes potential water damage from fire prevention and protection measures (e.g., sprinkler systems).

### **5.1.5 Fire Prevention and Protection**

The GPO-CA secure facility is fully wired for fire detection, alarm and suppression. Routine, frequent inspections of all systems shall be made to assure adequate operation.

### **5.1.6 Media Storage**

GPO-CA media shall be stored so as to protect it from accidental damage (water, fire, electromagnetic). Media that contains audit, archive, or backup information shall be duplicated and stored in a location separate from the GPO-CA.

### **5.1.7 Waste Disposal**

Paper documents shall be shredded using a cross-cut shredder that complies with NSA/CSS 02-01. Digital information on digital media that is to be disposed of is first sanitized using COTS software, which shall comply with DoD and FIPS standards for information clearing/sanitization.

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Digital media that is to be destroyed shall be destroyed in accordance with DoD Standard 5220.22- M. Hard disks shall be mechanically destroyed after all information is sanitized. Magnetic tape shall be destroyed by first cutting the tape into at least 4 pieces and then running at least 2 of the pieces through a cross-cut shredder.

### **5.1.8 Off-Site Backup**

The GPO-CA requires that full system backups, sufficient to recover from system failure, shall be made on a periodic schedule. Backups are to be performed and stored off-site not less than once per week. At least one full backup copy shall be stored at an offsite location (separate from the GPO-CA equipment). Only the latest full backup need be retained. The backup shall be stored at a site with physical and procedural controls commensurate to that of the operational GPO-CA.

## **5.2 PROCEDURAL CONTROLS**

### **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 people selected to fill these roles must be extraordinarily responsible or the integrity of the CA is weakened. The functions performed in these roles form the basis of trust for all uses of the GPO-CA. Two approaches are taken to increase the likelihood that these roles can be successfully carried out. The first ensures that the person filling the role is trustworthy and properly trained. The second distributes the functions among more than one person, so that any malicious activity would require collusion.

At a minimum the following roles will be used:

1. *GPO-OA System Administrator (GPO-OASA)* – authorized to install, configure, and maintain the CA; establish and maintain user accounts; and configure audit parameters
2. *GPO-OA Officer – Master Users* – authorized to configure certificate profiles; and generate component keys
3. *GPO-OA Officer – Security Officers* – authorized to manage (including issuance and revocation) Cross certificates, CA certificate and Trusted Role Subscriber certificates
4. *GPO-OA Officer– Registration Authority* – authorized to request or approve subscriber certificates or subscriber certificate revocations
5. *GPO-OA Officer – Directory Administrators* – maintaining the PKI entries in the certificate repository

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6. *GPO Security Compliance Auditor* – authorized to view and maintain audit logs
  7. *GPO-OA Backup Operator (GPO-OABUO)* – authorized to perform system backup and recovery

#### **5.2.1.1 GPO-OA System Administrator**

The administrator role is responsible for:

- installation, configuration, and maintenance of the CA
- establishing and maintaining CA system accounts
- configuring audit parameters

GPO-OASAs do not issue certificates to subscribers.

#### **5.2.1.2 GPO OA Officer – Master Users**

The OA Officer - Master Users are responsible for:

- configuring certificate profiles or templates
- generating and backing up CA keys

##### **5.2.1.2.1 GPO OA Officer – Security Officers**

The OA Officer - Security Officers are responsible for:

- registering new Trusted Role Subscribers and requesting the issuance of certificates
- verifying the identity of Trusted Role Subscribers and accuracy of information included in certificates
- approving and executing the issuance of Cross certificates, CA certificates and Trusted Role Subscriber certificates
- requesting, approving and executing the revocation of Cross certificates, CA certificates and Trusted Role Subscriber certificates

##### **5.2.1.2.2 GPO OA Officer – Registration Authorities (RAs)**

The OA Officer – Registration Authority (RAs) Administrators are responsible for:

- registering new subscribers and requesting the issuance of certificates
- verifying the identity of subscribers and accuracy of information included in certificates
- approving and executing the issuance of subscriber certificates
- requesting, approving and executing the revocation of subscriber certificates

##### **5.2.1.2.3 GPO OA Officer – Directory Administrators**

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The OA Officer - Directory Administrators are responsible for maintaining the PKI entries in the certificate repository. The Directory Administrator can be an OA Officer – Security Officer or OA Officer – Administrator, but may **not** be an OA Officer – Master User or a Security Compliance Auditor.

### **5.2.1.3 GPO Security Compliance Auditor**

The auditor role is responsible for:

- reviewing, maintaining, and archiving audit logs
- performing or overseeing internal compliance audits to ensure that the GPO-CA is operating in accordance with this CP and the CPS

This role can have no other trusted role in the GPO PKI.

### **5.2.1.4 GPO Backup Operator**

The operator role is responsible for the CA equipment system backups and recovery or changing recording media. This role can be performed by the OA Officer-Administrator.

## **5.2.2 Number of Persons Required Per Task**

Multi person control is implemented to prevent accidental or malicious actions involving the GPO-CA. At a minimum the following actions require 2 or more individuals holding Trusted Roles (multi-party control for logical access operations cannot include the Auditor Trusted Role and in addition, where multi-party control for logical access is required, at least one of the parties shall be an Administrator.):

- Generation of GPO-CA Signing Keys
- Activating GPO-CA Signing Keys
- Using GPO-CA Signing Keys
- Deactivating GPO-CA Signing Keys
- Backing up or Duplicating GPO-CA Private Signing Keys
- Physical Control of Backups of GPO-CA Signing Keys
- Physical Access or Control of the Cryptographic Module
- Physical Access or Control of the GPO-CA
- Physical Access or Control of the Safes and/or Secure Containers
- Physical Access to the GPO-CA
- Audit Log Review and Oversight
- Recovery of a subscribers encryption private key for a third party as directed by the GPO-CA Policy Authority or legal judgment

### **5.2.3 Identification and Authentication for Each Role**

An individual shall identify and authenticate him/herself before being permitted to perform any actions set forth above for that role or identity.

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## **5.2.4 Roles Requiring Separation of Duties**

Role separation, when required as set forth below, may be enforced either by the CA equipment, or procedurally, or by both means. The separation provides a set of checks and balances over the GPO-CA operation.

CA personnel shall be specifically designated to the roles defined in Section 5.2.1 above. Individuals may assume more than one role, however, individuals who assume a Security Compliance Auditor role may not hold any other trusted role, individuals who assume an Officer role may not assume a System Administrator role (i.e. an Officer may also be a Backup Operator, a System Administrator may also be a Backup Operator). Individuals may not assume more than one of the following roles: OA Officer – Master User, OA Officer – Security Officer, or OA Officer – Administrator. The OA Officer – Directory Administrator may be an OA Officer – Security Officer or OA Officer – Registration Authority but may not be an OA Officer – Master User. The CA system shall identify and authenticate its users and shall ensure that no user identity can assume a Security Compliance Auditor role and any other role, or both a System Administrator and an Officer role. No individual shall be assigned more than one identity.

## **5.3 PERSONNEL CONTROLS**

### **5.3.1 Qualifications, Experience, and Clearance Requirements**

All persons filling trusted roles shall be selected on the basis of loyalty, trustworthiness, and integrity, and must be U.S. citizens. The detail requirements governing the qualifications, selection and oversight of individuals who operate, manage, oversee, and audit the CA shall be set forth in the GPO CPS.

There are no security clearance requirements in this CP. The GPO CPS will specify GPO-CA personnel security clearances stipulations that may exceed these requirements.

### **5.3.2 Background Check Procedures**

The GPO-CA shall conduct background checks on personnel that hold Trusted Roles that includes checks for the following:

- Employment
- education
- references
- place of residence
- credit checks

- criminal record checks (law enforcement)

All personnel that fill a GPO-CA Trusted Role shall be a U.S. citizen and shall have a NAC-I background check conducted that is suitably adjudicated in accordance with federal law. The NAC-I check shall go back at least five (5) years. The highest level educational degree obtained shall be verified. Place of residence checks shall go back at least three (3) years. The GPO Personnel Security Office shall conduct all background and NAC-I checks in accordance with federal law.

An active, current GPO security clearance (Secret, or Top Secret or above) may be used in lieu of the personnel screening identified above to establish that a NAC-I background check is conducted that is suitably adjudicated in accordance with federal law, since a GPO security clearance at the Secret, Top Secret or above level requires a full scope SSBI background investigation that meets and exceeds the NAC-I requirements, and to keep a GPO security clearance active requires that it be renewed (and another background check conducted) at least every five (5) years. Thus, an active GPO security clearance at the Secret, Top Secret or above level meets or exceeds the NAC-I background check requirements.

### **5.3.3 Training Requirements**

All personnel performing duties with respect to the operation of the GPO-CA shall receive comprehensive training. Training shall be conducted in the following areas:

- CA/RA security principles and mechanisms
- All PKI software versions in use on the GPO-CA system
- All PKI duties they are expected to perform
- Disaster recovery and business continuity procedures
- Physical Security Procedures

### **5.3.4 Retraining Frequency and Requirements**

Individuals responsible for GPO-CA roles shall be aware of changes in the GPO-CA operation. Any significant change to the operations shall have a training (awareness) plan, and the execution of such plan shall be documented. Examples of such changes are GPO-CA software or hardware upgrade, changes in automated security systems, and relocation of equipment.

### **5.3.5 Job Rotation Frequency and Sequence**

Not applicable.

### **5.3.6 Sanctions for Unauthorized Actions**

Any person that operates in violation of this CP or the CPS or the practices and procedures stated herein, whether through negligence or with malicious intent, shall have privileges revoked and may be subject to administrative and disciplinary action. Violations of this CP or the CPS that

are determined by the GPO Operational Authority based on a fact based investigation to be due to malicious intent, shall subject to some form of administrative or disciplinary action, which shall be documented in writing by the GPO OA. Repeated or significant violation of the CP or CPS requirements shall result in privilege revocation and disciplinary action, which shall be documented in writing by the GPO OA. The range of disciplinary actions available shall include termination.

### **5.3.7 Independent Contractor Requirements**

Contractor personnel employed to perform functions pertaining to the GPO-CA shall meet applicable requirements set forth in this CP, including section 5.3.1 above. Vendors who provide services to the GPO PKI shall establish procedures to ensure that any subcontractors who directly provide services to the GPO PKI perform in accordance with the requirements of this CP, including section 5.3.1 above.

### **5.3.8 Documentation Supplied to Personnel**

The GPO-CA shall make available to its CA and RA personnel the certificate policies it supports, relevant parts of the GPO CPS, and any relevant statutes, policies or contracts. Documentation shall be maintained identifying all personnel who received training and the level of training completed.

## **5.4 AUDIT LOGGING PROCEDURES**

Audit log files shall be generated for all events relating to the security of the GPO-CA. Since the GPO-CA is operated in a virtual machine environment (VME), audit logs shall be generated for all applicable events on both the virtual machine (VM) and isolation kernel (i.e. hypervisor). Where possible, the security audit logs shall be automatically collected. Where this is not possible, a logbook, paper form, or other physical mechanism shall be used. All security audit logs, both electronic and non-electronic, shall be retained and made available during compliance audits. The security audit logs for each auditable event defined in this section shall be maintained in accordance with Sections 5.4.3 and 5.5.2 of this CP below.

### **5.4.1 Types of Events Recorded**

All security auditing capabilities of the GPO-CA operating system and PKI CA applications required by this CP shall be enabled. As a result, most of the events identified in the table shall be automatically recorded. (Note: the table below may be replaced in future releases of this CP with a reference to the Certificate Issuing and Management Components Protection Profile being developed by NIST.) At a minimum, each audit record shall include the following (either recorded automatically or manually for each auditable event):

- Type of event

- Date and time the event occurred
- Success or failure indicator when executing the GPO-CA signing process
- Success or failure indicator when performing certificate revocation
- Identity of the entity and/or operator (of the GPO-CA) that caused the event
- Message from any source requesting an action by the GPO-CA is an auditable event (message must include message date and time, source, destination and contents)

<b>Auditable Event</b>
<b>SECURITY AUDIT</b>
Any changes to the Audit parameters, e.g., audit frequency, type of event audited
Any attempt to delete or modify the Audit logs
Obtaining a third-party time-stamp
<b>IDENTIFICATION AND AUTHENTICATION</b>
Successful and unsuccessful attempts to assume a role
Change in the value of maximum authentication attempts
Maximum number of unsuccessful authentication attempts during user login exceeds the <i>maximum authentication attempts</i> value
An Administrator unlocks an account that has been locked as a result of unsuccessful authentication attempts
An Administrator changes the type of authenticator, e.g., from password to biometrics
<b>KEY GENERATION</b>
Whenever the GPO-CA generates a key. (Not mandatory for single session or one-time use symmetric keys)
<b>PRIVATE KEY LOAD AND STORAGE</b>
The loading of Component private keys
All access to certificate subject private keys retained within the GPO-CA for key recovery purposes
<b>TRUSTED PUBLIC KEY ENTRY, DELETION AND STORAGE</b>
All changes to the trusted public keys, including additions and deletions
<b>SECRET KEY STORAGE</b>

<b>Auditable Event</b>
The manual entry of secret keys used for authentication
<b>PRIVATE AND SECRET KEY EXPORT</b>
The export of private and secret keys (keys used for a single session or message are excluded)
<b>CERTIFICATE REGISTRATION</b>
All certificate requests
<b>CERTIFICATE REVOCATION</b>
All certificate revocation requests
<b>CERTIFICATE STATUS CHANGE APPROVAL</b>
The approval or rejection of a certificate status change request
<b>GPO-CA CONFIGURATION</b>
Any security-relevant changes to the configuration of the GPO-CA
<b>ACCOUNT ADMINISTRATION</b>
Roles and users are added or deleted
The access control privileges of a user account or a role are modified
<b>CERTIFICATE PROFILE MANAGEMENT</b>
All changes to the certificate profile
<b>REVOCATION PROFILE MANAGEMENT</b>
All changes to the revocation profile
<b>CERTIFICATE REVOCATION LIST PROFILE MANAGEMENT</b>
All changes to the certificate revocation list profile
<b>LOCAL DATA ENTRY</b>
All security-relevant data that is entered in the system
<b>REMOTE DATA ENTRY</b>
All security-relevant messages that are received by the system
<b>DATA EXPORT AND OUTPUT</b>

<b>Auditable Event</b>
All successful and unsuccessful requests for confidential and security-relevant information
<b>MISCELLANEOUS</b>
<i>Installation of the Operating System</i>
<i>Installation of the GPO-CA</i>
<i>Installing hardware cryptographic modules</i>
<i>Removing hardware cryptographic modules</i>
<i>Destruction of cryptographic modules</i>
<i>System Startup</i>
<i>Logon Attempts to GPO-CA Apps</i>
<i>Receipt of Hardware / Software</i>
<i>Attempts to set passwords</i>
<i>Attempts to modify passwords</i>
<i>Backing up GPO-CA internal database</i>
<i>Restoring GPO-CA internal database</i>
<i>File manipulation (e.g., creation, renaming, moving)</i>
<i>Posting of any material to a repository</i>
<i>Access to GPO-CA internal database</i>
<i>All certificate compromise notification requests</i>
<i>Loading tokens with certificates</i>
<i>Shipment of Tokens</i>
<i>Zeroizing tokens</i>
<i>Rekey of the GPO-CA</i>
<i>Configuration changes to the CA server involving:</i>
<i>Hardware</i>
<i>Software</i>
<i>Operating System</i>
<i>Patches</i>
<i>Security Profiles</i>

<b>Auditable Event</b>
<i>Appointment of an individual to a trusted role</i>
<i>Designation of personnel for multi-party control</i>
<b><i>PHYSICAL ACCESS / SITE SECURITY</i></b>
<i>Personnel Access to room housing GPO-CA</i>
<i>Access to the GPO-CA server</i>
<i>Known or suspected violations of physical security</i>
<b><i>ANOMALIES</i></b>
<i>Software Error conditions</i>
<i>Software check integrity failures</i>
<i>Receipt of improper messages</i>
<i>Misrouted messages</i>
<i>Network attacks (suspected or confirmed)</i>
<i>Equipment failure</i>
<i>Electrical power outages</i>
<i>Uninterruptible Power Supply (UPS) failure</i>
<i>Obvious and significant network service or access failures</i>
<i>Violations of Certificate Policy</i>
<i>Violations of Certification Practice Statement</i>
<i>Resetting Operating System clock</i>

### **5.4.2 Frequency of Processing Log**

Audit logs shall be reviewed at least once every week. All significant events shall be explained in an audit log summary. Such reviews involve verifying that the log has not been tampered with, and then briefly inspecting all log entries, with a more thorough investigation of any alerts or irregularities in the logs. Actions taken as a result of these reviews shall be documented.

A statistically significant set of security audit data generated by the GPO-CA, since the last review, shall be examined (where the confidence intervals for each category of security audit data are determined by the security ramifications of the category and the availability of tools to perform such a review), as well as a reasonable search for any evidence of malicious activity. For the GPO-CA, at least 70% of security audit data generated by the GPO-CA since the last review shall be examined.

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### **5.4.3 Retention Period for Audit Log**

Audit logs shall be retained onsite until they are reviewed and for at least two months, as well as being retained in the manner described below. The individual who removes audit logs from the GPO-CA system shall be an official different from the individuals who, in combination, command the GPO-CA signature key.

The audit log data is kept live on the CA or RA hardware and archived as specified below.

### **5.4.4 Protection of Audit Log**

The audit process shall not be done by or under the control of the GPO-OA. GPO-CA system configuration and procedures must be implemented together to ensure that:

- only authorized people have read access to the logs
- only authorized people may archive audit logs
- audit logs are not modified

The entity performing audit log archive need not have modify access, but procedures must be implemented to protect archived data from destruction prior to the end of the audit log retention period (If a system over-writes audit logs after a given time, the audit log is not considered deleted or destroyed if the audit log has been backed up and archived). The off-site storage location for audit logs shall be a safe, secure storage location that is off-site and separate from the primary location GPO-CA equipment.

### **5.4.5 Audit Log Backup Procedures**

Audit logs and audit summaries shall be backed up at least weekly. A copy of the audit log shall be sent off-site in accordance with the GPO CPS on a weekly basis.

### **5.4.6 Audit Collection System (Internal vs. External)**

The audit log collection system may or may not be external to the GPO-CA. Audit processes shall be invoked at system startup, and cease only at system shutdown. Should it become apparent that an automated audit system has failed, and the integrity of the system or confidentiality of the information protected by the system is at risk, then the GPO-OA shall determine whether to suspend GPO-CA operation until the problem is remedied.

### **5.4.7 Notification to Event-Causing Subject**

This CP imposes no requirement to provide notice that an event was audited to the individual, organization, device, or application that caused the event.

### **5.4.8 Vulnerability Assessments**

The Operational Authority will perform routine self-assessments of security controls for evidence of malicious activity.

## 5.5 RECORDS ARCHIVAL

### 5.5.1 Types of Events Archived

GPO-CA archive records shall be sufficiently detailed to establish the proper operation of the GPO-CA, or the validity of any certificate (including those revoked or expired) issued by the GPO-CA.

At a minimum, the following data shall be recorded for archive:

<b>Data To Be Archived</b>	
CA accreditation (if applicable)	
Certificate Policy	
Certification Practice Statement	
Contractual obligations	
Other agreements concerning operations of the CA	
System and equipment configuration	
Modifications and updates to system or configuration	
Certificate requests	
Revocation requests	
Subscriber identity Authentication data as per Section 3.2.3	
Documentation of receipt and acceptance of certificates (if applicable)	
Subscriber Agreements	
Documentation of receipt of tokens	
All certificates issued or published	
Record of CA Re-key	
All CRLs issued and/or published	
Other data or applications to verify archive contents	
Compliance Auditor reports	

<b>Data To Be Archived</b>	
Any changes to the Audit parameters, e.g., audit frequency, type of event audited	
Any attempt to delete or modify the Audit logs	
Whenever the CA generates a key (Not mandatory for single session or one-time use symmetric keys)	
All access to certificate subject private keys retained within the CA for key recovery purposes	
All changes to the trusted public keys, including additions and deletions	
The export of private and secret keys (keys used for a single session or message are excluded)	
The approval or rejection of a certificate status change request	
Appointment of an individual to a Trusted Role	
Destruction of cryptographic modules	
All certificate compromise notifications	
Remedial action taken as a result of violations of physical security	
Violations of Certificate Policy	
Violations of Certification Practice Statement	

### 5.5.2 Retention Period for Archive

Archive data must be retained for a minimum of 10 years and 6 months. Executive branch agencies must follow either the General Records Schedule established by the National Archives and Records Administration or an agency-specific schedule as applicable. All other entities shall comply with their respective records retention policies in accordance with whatever laws apply to those entities.

This minimum retention period for these records is intended only to facilitate the operation of the GPO-CA.

If the original media cannot retain the data for the required period, a mechanism to periodically transfer the archived data to new media shall be defined by the archive site. Alternatively, an Entity may retain data using whatever procedures have been approved by NARA for that category of documents. Applications that are required to process the archive data shall also be maintained for a period determined by the GPO-PA for the GPO-CA.

Prior to the end of the archive retention period, the GPO-CA shall provide archived data and the applications necessary to read the archives to a GPO-PA approved archival facility, which shall retain the applications necessary to read this archived data.

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### **5.5.3 Protection of Archive**

No unauthorized user shall be permitted to write to, modify, or delete the archive. For the GPO-CA, archived records may be moved to another medium when authorized by the GPO-OA. The contents of the archive shall not be released except as determined by the GPO-PA for the GPO-CA or as required by law. Records of individual transactions may be released upon request of any subscribers involved in the transaction or their legally recognized agents. Archive media shall be stored in a safe, secure storage facility separate from the GPO-CA.

If the original media cannot retain the data for the required period, a mechanism to periodically transfer the archived data to new media shall be defined by the GPO-CA and approved by the GPO PA and OA. Alternatively, the GPO-CA may retain data using whatever procedures have been approved by NARA for that category of documents. Applications required to process the archive data shall also be maintained for a period determined by the GPO PA and OA.

### **5.5.4 Archive Backup Procedures**

Archive files shall be backed up along with the security audit logs.

Paper archives shall be scanned digitally to digital media, or other long-term storage solution. The GPO-CA CPS shall specify the details of which media type is used, the frequency and other procedural details. The CPS shall also specify how archive backup files are managed.

### **5.5.5 Requirements for Time-Stamping of Records**

CA records shall be time stamped as they are created. Time-stamping of records is accomplished via the GPO-CA system, using the GPO-CA system clock. The GPO-CA system clock is synchronized on a periodic basis with the NIST official time source, using the IETF standard Network Time Protocol (NTP), or equivalent process/time source, to ensure that the CA system clock is accurate. The NTP service is set for automatic service startup on the CA system to ensure that the NTP service is always started whenever the CA system must be started.

### **5.5.6 Archive Collection System (Internal or External)**

The GPO-CA systems, or the GPO Trusted Role staff, may collect archive data in any expedient manner, provide the collection process does not modify or delete the archive records and protects the data as outlined in Section 5.5.3.

### **5.5.7 Procedures to Obtain and Verify Archive Information**

Procedures detailing how to create, verify, package, transmit, and store the GPO-CA archive information shall be published in the GPO CPS.

The contents of the archive shall not be released except as determined by GPO PA or as required by law. Records of individual transactions may be released upon request of any subscribers involved in the transaction or their legally recognized agents.

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## 5.6 KEY CHANGEOVER

To minimize risk from compromise of a GPO-CA's private signing key, that key may be changed; from that time on, only the new key will be used for certificate signing purposes. The older, but still valid, GPO-CA certificate will be available to verify old signatures until all of the certificates signed using the associated private key have also expired. The new CA key shall comply with the validity period requirements in section 6.3.2 of this CP. The GPO-CA uses key rollover certificates using the facilities of the Entrust COTS PKI software (which is FIPS certified) and the SafeNet HSM (also FIPS certified) to accomplish CA key changeover. The old CA key is held and protected using the same mechanisms as the new CA key, which shall utilize the SafeNet LunaSA HSM (which shall be FIPS certified to Level 3) and the Entrust COTS PKI software.

After a CA performs a Key Changeover, the CA may continue to issue CRLs with the old key until all certificates signed with that key have expired. As an alternative, after all certificates signed with that old key have 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 shall be available for all relying parties until the validity period of all issued certificates has past. Once the last CRL has been issued, the old private signing key of the CA may be destroyed.

The Subscriber certificates issued by the GPO-CA shall be capable of automatic key roll-over. As such, the encryption and digital signature key pairs of the Subscriber shall be automatically updated prior to expiry.

The GPO CA cross-certified with the FBCA must be able to continue to interoperate with the FBCA after the FBCA performs a key rollover, whether or not the FBCA DN is changed by the FBCA.

## 5.7 COMPROMISE AND DISASTER RECOVERY

In any key compromise situation, a report will be filed with the GPO PA indicating the circumstances under which the compromise occurred. The Federal PKIPA shall be notified by GPO PA in every confirmed instance of a key compromise.

### 5.7.1 Incident and Compromise Handling Procedures

The GPO PA shall notify the members of the Federal PKI Policy Authority, and all subordinate CAs, if any, of the following cases occur:

- Suspected or detected compromise of GPO-CA systems;
- Physical or electronic attempts to penetrate GPO-CA systems;
- Denial of service attacks on GPO-CA components;
- Any incident preventing the GPO-CA from issuing a CRL within 24 hours of the time specified in the next update field of its currently valid CRL.

This will allow other entities to protect their interests as Relying Parties.

The GPO OA shall reestablish operational capabilities as quickly as possible in accordance with procedures set forth in the GPO CPS.

Notification to the FPKIPA will follow the requirements of the MOA between the GPO PKI and the FPKIPA (FBCA).

The GPO Computer Security Incident Response Team (CSIRT) Procedures shall be used by the GPO PA and GPO OA when handling incidents or compromise events. These procedures are included in the GPO PCA and SCA CPS by reference.

These procedures include the following steps:

- Report and document the incident (by using the GPO IT Help Desk ticketing system) (All steps for responding to the incident in the following steps will be documented also)
- Identify the nature and scope of the incident
- Notification of the incident and its associated potential impacts and affects to stakeholders (Federal PKIPA, Subscribers, PA, OA, and Relying Parties)
- Protecting Evidence and Logs
- Containment of the results and effects of the incident to reduce adverse impacts
- Eradication of the causes and sources of the incident and any adverse results
- Recovery to restore the GPO-PCA and/or SCA to effective and efficient operations
- Follow-up to notify stakeholders (Federal PKIPA, Subscribers, GPO PA, GPO OA and Relying parties) of the results of the recovery from the incident and GPO-SCA operational status
- Post-incident review to ensure lessons learned are incorporated into future operations and practices

In the event of an incident as described above, the GPO PA shall notify the FPKIPA within 24 hours of incident discovery, along with preliminary remediation analysis.

Within ten (10) business days of incident resolution, the GPO PA shall post a notice on the GPO PKI publically accessible web page identifying the incident and provide notification to the FPKIPA. The public notice shall include the following:

1. Which CA components were affected by the incident;
2. The CA's interpretation of the incident;
3. Who was impacted by the incident;
4. When the incident was discovered;
5. A complete list of all certificates that were either issued erroneously or not compliant with the GPO CP/CPS as a result of the incident; and
6. A statement that the incident has been fully remediated.

The notification provided directly to the FPKIPA shall also include detailed measures taken to remediate the incident.

### **5.7.2 Computing Resources, Software, and/or Data are Corrupted**

If GPO-CA computing resources, software, and/or data are corrupted, the GPO PA and OA shall respond as follows:

- Before returning to operation, ensure that the system's integrity has been restored
- If the CA signature keys are not destroyed, CA operation shall be reestablished, giving priority to the ability to generate certificate status information within the CRL issuance schedule specified in 4.9.7.
- If the CA signature keys are destroyed, CA operation shall be reestablished as quickly as possible, giving priority to the generation of a new CA key pair.

The integrity of the system shall be ensured at all times as GPO-CA equipment/systems are restored to operation.

In the event of an incident as described above, the GPO PA shall post a notice on the GPO PKI web page identifying the incident and provide notification to the FPKIPA. See Section 5.7.1 above for contents of the notice.

### **5.7.3 GPO-CA Private Key Compromise Procedures**

If the GPO-CA signature keys are compromised or lost (such that compromise is possible even though not certain):

- The GPO-PA and any cross-certified Entity CA shall be securely notified as soon as practical (so that Entities may issue CARLs/CRLs revoking any cross-certificates issued to the GPO-CA); for this CP, the only Entity CA GPO is cross-certified with is the Federal PKI Trust Infrastructure, including the Federal Bridge CA (FBCA)
- A new GPO-CA key pair shall be generated securely by the GPO-CA in accordance with the requirements of this CP and the procedures set forth in the GPO-CA CPS
- New GPO-CA certificates shall be issued in accordance with the requirements of this CP (including section 6.1.4 for any self-signed CA certificates) and as specified in the GPO-CA CPS.

The GPO-CA Operational Authority (OA) shall also investigate and report to the GPO-PA what caused the compromise or loss, and what measures have been taken to preclude recurrence.

In the event of the compromise of the GPO-CA private key, the federal PKI PA will be informed via secure communication from the OA. The CA installation shall be reestablished in accordance with any instructions and direction from the GPO OA and the GPO PKI Policy Authority. In general, the OA shall revoke the certificates for the GPO-CA, install a new GPO-CA, generate a new GPO-CA certificate, and publish the new GPO-CA certificate to the directory. The OA shall review all MOA's that exist and make determination of any other CA's that may cross-certified, and then notify each and every one of any CA's that are cross-certified.

The OA shall notify the Subscribers of the GPO-CA of the key compromise via a secure communication. The Subscriber certificates shall be renewed automatically by the GPO-CA under the new CA key pair, using the capabilities of the CA software. The fingerprint of the new GPO-CA key pair shall be placed onto the GPO PKI web site (<http://www.gpo.gov/projects/pki.htm>) and all Subscribers instructed by email from the GPO PKI service that this fingerprint can be validated as a backup method to ensure that the proper new CA key is installed.

The GPO PA shall post a notice the GPO PKI web page describing the compromise. See Section 5.7.1 for contents of the notice.

#### **5.7.3.1 GPO-CA Signature Keys are Revoked**

If the GPO-CA cannot issue a CARL/CRL prior to the time specified in the next update field of its currently valid CARL/CRL, then the GPO-PA and any cross-certified Entity CA shall be securely notified as soon as practical. The GPO-CA shall reestablish revocation capabilities as quickly as possible in accordance with procedures set forth in the GPO CPS. The GPO-CA shall, as soon as practical, securely advise the GPO-PA and any cross-certified Entity CA in the event of a disaster where the GPO-CA installation is physically damaged and all copies of the GPO-CA signature keys are destroyed. For this CP at this time, the only cross-certified Entity CA is the Federal PKI Trust Infrastructure, including the Federal Bridge CA (FBCA).

#### **5.7.4 Business Continuity Capabilities after a Disaster**

The GPO OA shall maintain a PKI Contingency (Disaster Recovery) Plan and shall operate an off-site backup site, whose purpose is to ensure continuity of operations in the event of failure of the

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GPO-CA primary site. The GPO OA shall deploy the GPO-CA directory (Repository) system to provide 24 hour, 365 day per year availability, which is facilitated by the use of the off-site backup facility. The GPO OA shall implement features to provide high levels of directory reliability within the scope of its control.

In the case of a disaster damaging or rendering all GPO-CA equipment inoperative, the GPO OA and Trusted Role staff team shall re-establish affected CA operations as quickly as possible, giving priority to the ability to revoke certificates, regardless of type or user. For the GPO-CA (PCA), this will require secure out-of-band distribution of the new certificate as well as issuance of new cross certificates, subordinate CA certificates, and Subscriber certificates.

Relying Parties may decide of their own volition whether to continue to use certificates signed with the destroyed private key pending reestablishment of GPO-CA operation with new certificates.

In the case of a disaster causing physical damage to a subordinate CA installation and resulting in destruction of all copies of the CA signature key, the subordinate CA shall request revocation of its certificates. The GPO OA and Trusted Role staff team will then completely rebuild the CA installation by reestablishing the CA equipment, generating new private and public keys, be re-certified, and re- issue all cross certificates. Finally, all Subscriber certificates will be re-issued. Relying Parties may make a judgment to continue to use certificates signed with the destroyed private key in order to meet urgent operational requirements. In any event, the GPO PA and OA shall securely notify all appropriate authorities (e.g., the FPKIPA, FPKI Management Authority, cross certified CAs, etc.) of the situation at the earliest feasible time in accordance with applicable MOAs and any other contractual agreements.

If a CA's signature keys are compromised, lost, or destroyed—such that compromise is possible even though uncertain—the GPO OA shall initiate an investigation and report to the PA concerning the cause of the compromise or loss and what measures have been taken to prevent recurrence. The GPO PA, in turn, will notify the appropriate authorities in accordance with applicable MOAs (FPKIPA, etc.) and any other contractual agreements.

## **5.8 CA OR RA TERMINATION**

In the event of termination of the GPO-CA operation, certificates signed by the GPO-CA shall be revoked and the GPO-PA shall advise agencies that have entered into MOAs with the GPO-PA (including the FPKIPA and FBCA), prior to termination, that GPO-CA plans to terminate operation so they may revoke certificates they have issued to the GPO-CA. All affiliated entities (FPKIPA, agencies) shall be notified by the GPO-PA prior to termination of the GPO-CA. Prior to GPO-CA termination, the GPO-CA shall provide archived data to a GPO-PA approved archival facility.

All affiliated entities (FPKIPA, any other cross-certified entities, etc.) will be given as much advance notice as circumstances permit, and attempts to provide alternative sources of interoperation will be sought in the event the GPO-CA were to be terminated.

In the event that the GPO-CA terminates operation, the GPO-CA shall ensure that any certificates issued to the GPO-CA have been revoked.

Whenever possible, the FPKIPA shall be notified by the GPO PA at least two (2) weeks prior to the termination of any GPO CA cross-certified with the FBCA. For emergency termination, the GPO CA shall follow the notification procedures in section 5.7.

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## **6. TECHNICAL SECURITY CONTROLS**

### **6.1 KEY PAIR GENERATION AND INSTALLATION**

#### **6.1.1 Key Pair Generation**

##### **6.1.1.1 GPO-PKI and GPO-CA Key Pair Generation**

Cryptographic keying material for certificates issued by the GPO-CA shall be generated in FIPS 140 validated cryptographic modules. For the GPO-CA, the modules shall meet or exceed Security Level 3.

Multiparty control is required for GPO-CA key pair generation, as specified in Section 5.2.2.

The GPO-CA and GPO Subordinate CAs must document their key generation procedure in their CPSs, and generate auditable evidence that the documented procedures were followed. The documentation of the procedure must be detailed enough to show that appropriate role separation was used. The execution of the key generation process shall be validated by an independent third party, either by witnessing the key generation or by examining the signed and documented record of the key generation.

##### **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 procedure must meet the requirements for key pair delivery specified in Section 6.1.2. All key generation shall be performed using a FIPS approved method.

For Medium Hardware assurance levels, the Subscriber, RA, or CA shall generate the Subscriber key pairs in hardware cryptographic modules validated to FIPS 140 Level 2 or above. For all other assurance levels, the Subscriber, RA, or CA shall use either validated software or hardware cryptographic modules for key generation.

#### **6.1.2 Private Key Delivery to the Subscriber**

If Subscribers generate their own key pairs, then there is no need to deliver private keys, and this section does not apply.

If an Entity other than the Subscriber generates a private key, the GPO OA or RA shall deliver the key to the Subscriber electronically or in a hardware token from which the private key cannot be

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extracted in unencrypted form. Any transmission of a private key over a network must use be encrypted.

In all cases, the following requirements must be met:

- Anyone who generates a private signing key for a Subscriber shall 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 shall acknowledge receipt of the private key(s).
- Delivery shall 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 shall be encrypted using a cryptographic algorithm and key size at least as strong as the private key (see below for more detail). Activation data shall be delivered using a separate secure channel.
  - For shared key applications, organizational identities, and network devices, see also Section 3.2.

The GPO-CA generates its own key pair and therefore does not need private key delivery. Private decryption keys shall be delivered by the GPO-CA using the security protection provided by PKIX-CMP protocol in the COTS PKI software, and shall use cryptographic algorithms in the PKIX-CMP that are as strong or stronger than the 2048 bit RSA public/private key pairs. The GPO Operational Authority shall use the COTS software capabilities for PKIX-CMP, or equivalent, which shall provide strong encryption algorithms and key sizes that are as strong or stronger than the 2048 bit RSA public/private key pairs used by the GPO-CA, to protect these RSA private decryption keys.

For Subscribers that will have Medium-Hardware Assurance certificates, the private decryption keys shall be stored in a hardware module that meets FIPS 140-2 Level 2 requirements.

The GPO-CA shall maintain a record of the subscriber acknowledgement of receipt of the token.

### **6.1.3 Public Key Delivery to Certificate Issuer**

For the GPO-CA, 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 to the CA for certificate issuance.

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- The delivery mechanism shall 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.

The GPO-CA CPS provides further details on this.

#### **6.1.4 GPO-CA Public Key Delivery to Relying Parties**

When the GPO-CA updates its signature key pair, the GPO-CA shall distribute the new public key in a secure fashion using a key rollover certificate.

The GPO-CA shall post the certificates it issues in the GPO-CA repository. For Entity CAs to issue cross-certificates to the GPO-CA (such as the Federal PKI Trust Infrastructure, including Federal Bridge CA), the GPO-CA shall transport its public key to the Entity CA in a secure, out-of-band fashion to effect certificate issuance. For this CP at this time, the only Entity CA the GPO CA has an interoperability relationship and requirement for is the Federal PKI Trust Infrastructure, including the Federal Bridge CA (FBCA).

When a CA key rollover is accomplished, the GPO-CA shall issue a key rollover certificate, which the COTS PKI software used by GPO-CA shall automatically make available in the GPO border directory (repository). The CA shall sign the key rollover certificates with the CA's current private key, so secure distribution is not required. CA Certificates are signed with the issuing CA's current private key, so secure distribution is not required.

The GPO-CA shall make its public keys available for creation and verification of certification trust paths, in the form of a self-signed public-key certificate. The CA shall deliver this self-signed certificate to Subscribers in a manner commensurate with the security offered by the public key in the certificate. CAs shall convey self-signed certificates to Relying Parties in a secure fashion to preclude substitution attacks. Such 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

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### 6.1.5 Key Sizes

The GPO-CA and all GPO PKI CA's shall use public keys that are at least 2048 bits for RSA.

Any Public keys in all self-signed CA certificates used by the GPO-CA that expire after 12/31/2030 shall be at least 3072 bits for RSA.

All valid certificates shall be signed by the GPO-CA with keys of at least 2048 bits for RSA. All certificates, except self-signed certificates, that expire after 12/31/2030 shall be signed with keys of at least 3072 bits for RSA.

For Medium Assurance, signatures on certificates and CRLs use SHA-256.

Where implemented, CSSes shall sign responses using the same signature algorithm, key size, and hash algorithm used by the CA to sign CRLs.

End-entity certificates shall contain public keys that are at least 2048 bits for RSA, DSA, or Diffie-Hellman, or 160 bits for elliptic curve algorithms.

The following special conditions also apply:

End-entity certificates that expire after 12/31/2030 shall contain public keys that are at least 3072 bits for RSA or DSA, or 256 bits for elliptic curve algorithms.

All valid end-entity certificates that include a keyUsage extension that asserts the *nonRepudiation*, *keyEncipherment*, *dataEncipherment*, or *keyAgreement* bit shall contain public keys that are at least 2048 bits for RSA, DSA, or Diffie-Hellman.

The GPO-CA use of Secure Socket Layer (SSL), or TLS, or another protocol providing similar security to accomplish any of the requirements of this CP, if any, shall require at a minimum Triple-DES or equivalent for the symmetric key, and at least 2048 bit RSA or equivalent for the asymmetric keys.

The GPO-CA key modulus shall be a minimum of 2048 bits for RSA.

The GPO-CA CSS system key modulus shall be a minimum of 2048 bits for RSA.

Subscriber's key modulus shall be 2048 bits for RSA.

The GPO-CA shall use Triple DES or AES-256 for database encryption.

### 6.1.6 Public Key Parameters Generation and Quality Checking

Public key parameters prescribed in the Digital Signature Standard (DSS) shall be generated in accordance with FIPS 186.

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Parameter quality checking (including primarily testing for prime numbers) shall be performed in accordance with FIPS 186. The GPO-CA shall generate public key parameters in accordance with the standard that defines the cryptographic algorithm in which the parameters are used.

### **6.1.7 Key Usage Purposes (as Per X.509 v3 Key Usage Field)**

Keys are certified for use in signing, non-repudiation or encrypting. Public keys that are bound to human subscribers shall be used only for signing or encrypting, but not both. Subscriber certificates used for digital signatures (including authentication) will set the *digitalSignature* bit and the *nonRepudiation* bit (except for Device certificates). Device certificates issued will not have the *nonRepudiation* bit set. Certificates to be used for key or data encryption shall set the *keyEncipherment* and/or the *dataEncipherment* bit. GPO-CA certificates shall set two key usage bits: *cRLSign* and *CertSign*. Certificates to be used for key agreement, if used by the GPO-CA, shall set the *keyAgreement* bit.

Where the CA certificate also signs OCSP responses, the certificate may also set the *digitalSignature* and/or *nonRepudiation* bits.

Medium Assurance Level certificates may include a single key for use with encryption and signature in support of legacy applications. Such dual-use certificates shall be generated and managed in accordance with their respective signature certificate requirements, except where otherwise noted in this CP. Such dual-use certificates shall never assert the non-repudiation key usage bit, and shall not be used for authenticating data that will be verified on the basis of the dual-use certificate at a future time.

For End Entity certificates issued after June 30, 2019, the Extended Key Usage extension shall always be present and shall not contain anyExtendedKeyUsage {2.5.29.37.0}. Extended Key Usage OIDs shall be consistent with key usage bits asserted.

If a certificate is used for authentication of ephemeral keys, the Key Usage bit in the certificate must assert the DigitalSignature 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 *Security Requirements for Cryptographic Modules*, the latest version of FIPS 140 series. Cryptographic modules shall be validated to the latest version of the FIPS 140 series level identified in this section. The minimum FIPS 140 requirements for cryptographic modules are as follows:

- Certification Authority (CA) - Level 3 Hardware
- CSS – Level 2 Hardware
- Subscriber:

- Level 1 Hardware or Software for GPO Medium Assurance and GPO Device certificates
- Level 2 Hardware for GPO Medium-Hardware Assurance certificates
- Registration Authority (RA) - Level 2 Hardware

Private key storage for GPO-CA Subscribers that assert the GPO Medium Hardware OID for id-gpo-medium-hardware shall use a FIPS 140 Level 2 or higher validated cryptographic module for all private key operations.

### **6.2.1.1 Custodial Subscriber Key Stores**

Custodial Subscriber Key Stores hold keys for a number of Subscriber certificates in one location. When a collection of private keys for Subscriber certificates are held in a single location there is 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 shall be no less than FIPS 140 Level 1 (Hardware or Software). For all other levels, the cryptographic module shall 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 shall require authentication commensurate with the assurance level of the certificate.

### **6.2.2 Private Key Multi-Person Control**

Use of the GPO-CA private signing key shall require action by multiple persons as set forth in Section 5 of this CP.

### **6.2.3 Private Key Escrow**

#### **6.2.3.1 Escrow of GPO-CA and GPO Subordinate CA Keys**

Under no circumstances shall the GPO-CA or GPO Subordinate CA (SCA) signature keys used to sign certificates or CRLs be escrowed by a third-party.

#### **6.2.3.2 Escrow of CA Encryption Keys**

The GPO-CA shall not perform any encryption key recovery functions involving encryption keys issued to non-GPO Entity CAs.

#### **6.2.3.3 Escrow of Subscriber Private Signing Keys**

Subscriber private signature keys shall not be escrowed.

If a device has a separate encryption key pair, the encryption private key may be escrowed.

#### **6.2.3.4 Escrow of Subscriber private encryption and dual use keys**

Subscriber private dual use keys shall not be escrowed. Subordinate CAs may escrow any encryption keys whose certificates do not also contain the digital Signature key usage bit for the purpose of data recovery. Subscriber key management keys may be escrowed to provide key recovery as described in section 4.12.1. Keys in escrow must be protected using cryptography validated to the same FIPS 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 GPO-CA Private Signature Key**

The GPO-CA private signature keys shall be backed up under the same multi-person control as the creation of the original signature key. Such backup shall create only a single copy of the signature key at the GPO-CA location; a second copy shall be kept at the GPO-CA off-site backup location. All copies of the CA private signature key shall be accounted for and protected in the same manner as the original. Procedures for this shall be included in the GPO CPS.

#### **6.2.4.2 Backup of Subscriber Private Signature Key**

Subscriber private signature keys shall not be backed up, escrowed, copied or archived.

Subscriber private signature keys may be backed up or copied, but must be held in the Subscriber's control.

Backed up subscriber private signature keys shall not be stored in plain text form outside the cryptographic module. Storage must ensure security controls consistent with the protection provided by the subscriber's cryptographic module.

#### **6.2.4.3 Backup of Subscriber Private Key Management Key**

Backed up Subscriber private key management key shall not be stored in plaintext outside of the cryptographic module. Storage must ensure security controls consistent with the protection provided by the subscriber's cryptographic module.

#### **6.2.4.4 Backup of CSS Private Key**

The CSS Private Key may be backed up. The backup process shall be secure and utilize the same level of protection as for the original CSS private key.

#### **6.2.4.5 Backup of PIV-I Content Signing Key**

Not applicable at this time, since GPO does not issue PIV-I Content Signing certificates at this time.

#### **6.2.4.6 Backup of Device Private Keys**

Device private keys may be backed up or copied, but must be held under the control of the device's human sponsor or other authorized administrator. Backed up device private keys shall not be stored in plaintext form outside the cryptographic module. Storage must ensure security controls consistent with the protection provided by the device's cryptographic module.

#### **6.2.5 Private Key Archival**

The GPO-CA shall not escrow or archive private signature keys as outlined in Section 6.2.3. The GPO-CA and GPO Subordinate CAs may escrow or archive private encryption keys (key management or key transport) as outlined in Section 6.2.3.

#### **6.2.6 Private Key Transfer Into or From a Cryptographic Module**

GPO-CA private keys shall be generated by and remain within a cryptographic module. The GPO-CA private keys may be backed up in accordance with Section 6.2.4.1. At no time shall the CA private key exist in plain text outside the cryptographic module.

Subscriber private keys must be generated by and remain within a cryptographic module. In the event that the GPO OA transports a private key from one cryptographic module to another, the private key must be encrypted during transport. Private keys must never exist in plain text form outside the cryptographic module boundary.

The system must protect private or symmetric keys used to encrypt other private keys for transport, 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 a Cryptographic Module**

FIPS 140 requirements and section 6.2.1 above of this CP define the requirements.

#### **6.2.8 Method of Activating Private Keys**

The GPO-CA signing key activation requires multiparty control as specified in Section 5.2.2 of this CP.

The subscriber must be authenticated to the cryptographic module before the activation of any private key(s). When pass-phrases or PINs are used, they shall be a minimum of six (6)

characters. Acceptable means of authentication include but are not limited to pass-phrases, PINs or biometrics. Entry of activation data shall be protected from disclosure (i.e., the data should not be displayed while it is entered).

For certificates issued under the `mediumDevice` and `mediumDeviceHardware` policy OIDs, the device may be configured to activate its private key without requiring its human sponsor or authorized administrator to authenticate to the cryptographic token,

### **6.2.9 Method of Deactivating Private Key**

Cryptographic modules that have been activated shall not be left unattended or otherwise be available to unauthorized access. After use, the cryptographic module shall be deactivated, e.g., via a manual logout procedure, or automatically after a period of inactivity as defined in the applicable GPO CPS. Hardware cryptographic modules shall be removed and stored in a secure container when not in use and not in the possession of the private key owner.

### **6.2.10 Method of Destroying Private Key**

When the CA private key is to be destroyed, this shall only be under the conditions that the key is no longer needed and the certificates which correspond to it are expired or revoked, then this shall be performed using the FIPS compliant hardware module's zeroize command in accordance with the hardware module vendor's documentation. This shall be a scripted event with a written script, and only Trusted Role staff may perform this operation. The command shall be repeated at least one (1) time to ensure that the private key is destroyed. The applicable FIPS compliant hardware module shall be retained in storage at the GPO PKI facility, secured in a GSA compliant security container, in this event.

Individuals in trusted roles shall destroy RA and CSS status server (e.g., OCSP server) private signature keys when they are no longer needed. This will be performed using the hardware module's zeroize command in accordance with the hardware modules documentation.

Subscriber private signature keys shall be destroyed when they are no longer needed, or when the certificates to which they correspond expire or are revoked. For software cryptographic modules, this can be overwriting the data. For Subscriber private keys that are stored in a hardware token, the vendor software command to re-initialize and zeroize shall be used, following documentation of the vendor. Physical destruction of hardware is not required.

### **6.2.11 Cryptographic Module Rating**

See section 6.2.1 for this information.

## **6.3 OTHER ASPECTS OF KEY-PAIR MANAGEMENT**

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A single dual-use (digital signature and encryption) key pair is prohibited for Medium Hardware implementations, but may be issued on a case-by-case basis for Medium Assurance levels to support required legacy business application uses. Such dual-use key pairs shall be issued only in support of legacy applications as defined in Section 6.1.7. Human Subscribers shall typically have one key-pair for digital signature, and a separate key-pair for encryption. A Subscriber's digital signature key-pair shall never be escrowed, archived, or backed-up, to maintain technical non-repudiation of transactions. For business continuity reasons, the CA may escrow, archive, or back-up encryption key-pairs.

### **6.3.1 Public Key Archival**

The public key is archived as part of the certificate archival.

### **6.3.2 Certificate Operational Periods and Key Usage Periods**

The GPO-CA, since it employs a self-signed certificate for use as a trust anchor, shall limit the use of the associated private key to a maximum of 20 years; the self-signed certificate shall have a lifetime not to exceed 37 years. For all other CAs under this CP, the CA shall limit the use of its private keys to a maximum of six (6) years for subscriber certificates and ten (10) years for CRL signing and OCSP responder certificates. Code and content signers may use their private keys for three years; the lifetime of the associated public keys shall not exceed eight (8) years. Subscribers' signature private keys and certificates have a maximum lifetime of three (3) years. Subscriber key management certificates have a maximum lifetime of three (3) years; use of subscriber key management private keys is unrestricted.

The GPO-CA and GPO CAs shall not issue subscriber certificates that extend beyond the expiration date of their own certificates and public keys.

The validity period of the subscriber certificate must not exceed the routine re-key Identity Requirements as specified in section 3.3.1.

## **6.4 ACTIVATION DATA**

### **6.4.1 Activation Data Generation and Installation**

The activation data used to unlock GPO-CA or subscriber private keys, in conjunction with any other access control, shall have an appropriate level of strength for the keys or data to be protected. Activation data may be user selected. If the activation data must be transmitted, it shall be via an appropriately protected channel, and distinct in time and place from the associated cryptographic module. When CA re-key occurs, any passwords used by the GPO-CA as activation data for the CA signing key shall be changed.

### **6.4.2 Activation Data Protection**

Data used to unlock private keys shall be protected from disclosure by a combination of cryptographic and physical access control mechanisms. Activation data should either be biometric in nature or memorized, not written down. If written down, it shall be secured at the level of the data that the associated cryptographic module is used to protect, and shall not be

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stored with the cryptographic module. The protection mechanism shall include a facility to temporarily lock the account, or terminate the application after a predetermined number of login attempts as set forth in the GPO-CA CPS.

### **6.4.3 Other Aspects of Activation Data**

Not applicable at this time, since the GPO-CA does not issue PIV-I certificates at this time

## **6.5 COMPUTER SECURITY CONTROLS**

### **6.5.1 Specific Computer Security Technical Requirements**

The following computer security functions may be provided by the operating system, or through a combination of operating system, software, and physical safeguards. The GPO-CA and its components shall include the following functionality:

- Require authenticated logins
- Provide Discretionary Access Control
- Provide a security audit capability
- Restrict access control to GPO-CA services and PKI roles
- Enforce separation of duties for PKI roles
- Require identification and authentication of PKI roles and associated identities
- Prohibit object re-use or require separation for GPO-CA random access memory
- Require use of cryptography for session communication and database security
- Archive GPO-CA history and audit data
- Require self-test security related GPO-CA services
- Require a trusted path for identification of PKI roles and associated identities
- Require a recovery mechanisms for keys and the GPO-CA system
- Enforce domain integrity boundaries for security critical processes

For those portions of the GPO-CA operating in a VME, the following security functions also pertain to the hypervisor:

- Require authenticated logins
- Provide discretionary access control
- Provide a security audit capability
- Enforce separation of duties for PKI roles
- Prohibit object reuse or require separation for CA random access memory

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- Require use of cryptography for session communication and database security
  - Archive CA history and audit data
  - Require self-test security-related GPO-CA services
  - Enforce domain integrity boundaries for security-critical processes.

When GPO-CA equipment is hosted on evaluated platforms in support of computer security assurance requirements then the system (hardware, software, operating system) shall, when possible, operate in an evaluated configuration.

The GPO-CA and its ancillary parts shall also include the following functionality (in a VME, these functions are applicable to both the VM and hypervisor):

- 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; and
- support recovery from key or system failure.

For Certificate Status Servers, the computer security functions listed below are required (in a VME, these functions are applicable to both the VM and hypervisor):

- 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; and
- support recovery from key or system failure.

For remote workstations used to administer the CAs, the computer security functions listed below are 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)
- enforce domain integrity boundaries for security critical processes; and
- support recovery from key or system failure.

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All communications between any PKI trusted role and the CA shall be authenticated and protected from modification.

## **6.5.2 Computer Security Rating**

Not applicable.

## **6.6 LIFE-CYCLE TECHNICAL CONTROLS**

### **6.6.1 System Development Controls**

The System Development Controls for the GPO-CA are as follows:

- The GPO-CA shall use software that has been designed and developed under a development methodology
- The GPO-CA shall use COTS CA software that meets FIPS requirements.
- Hardware and software procured to operate the GPO-CA shall be purchased in a fashion to reduce the likelihood that any particular component was tampered with
- Hardware and software developed specifically for the GPO-CA shall be developed in a controlled environment, and the development process shall be defined and documented (this requirement does not apply to commercial off-the-shelf hardware or software)
- All hardware must be shipped or delivered via controlled methods that provide a continuous chain of accountability, from the purchase location to the GPO-CA physical location
- The GPO-CA hardware and software including the VME hypervisor, shall be dedicated to operating and supporting the CA (i.e., the systems and services dedicated to the issuance and management of certificates). There shall be no other applications, hardware devices, network connections, or component software, which are not part of the GPO-CA operation In a VME, a single hypervisor 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 a VME, all VM systems must operate in the same security zone as the CA.
- Proper care shall be taken to prevent malicious software from being loaded onto the GPO-CA equipment. Only applications required to perform the operation of the GPO-CA shall be obtained, from sources authorized by local policy. RA hardware and software shall be scanned for malicious code on first use and periodically afterward
- Hardware and software updates shall be purchased or developed in the same manner as original equipment, and be installed by trusted and trained personnel in a defined manner.

### **6.6.2 Security Management Controls**

The configuration of the GPO-CA system as well as any modifications and upgrades shall be documented and controlled. There shall be a mechanism for detecting unauthorized modification

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to the GPO-CA software or configuration. A formal configuration management methodology shall be used for installation and ongoing maintenance of the GPO-CA system. The GPO-CA software, when first loaded, shall be verified as being that supplied from the vendor, with no modifications, and be the version intended for use.

### **6.6.3 Life Cycle Security Controls**

Not applicable.

## **6.7 NETWORK SECURITY CONTROLS**

The Principal (root) GPO-CA shall not be connected to any network. The Subordinate GPO-CA shall be connected to at most one network. Use of appropriate boundary controls shall be employed, such as network guards, firewalls or filtering routers to guard against denial of service and intrusion attacks. Unused network ports and services shall be turned off. Any network software present shall be necessary to the functioning of the GPO-CA.

The GPO-CA CPS shall define the network protocols and mechanisms required for the operation of the GPO-CA Border Directory. Any boundary control devices used to protect the network on which PKI equipment is hosted shall deny all but the necessary services to the PKI equipment even if those services are enabled for other devices on the network.

## **6.8 TIME-STAMPING**

Asserted times shall be accurate within three (3) minutes. Use of automated methods via a NIST clock source and the Network Time Protocol (NTP) service is allowed as are manual methods. Clock adjustments are an auditable event per section 5.4.1 of this CP.

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## 7. CERTIFICATE, CRL AND OCSP PROFILES

### 7.1 CERTIFICATE PROFILE

The GPO-CA shall issue X.509 Version 3 certificates.

The CPS shall define in detail the actual format of certificates issued by the GPO-CA.

Certificates issued by the GPO-CA shall conform to the Federal PKI (FPKI) X.509 Certificate and CRL Extensions Profile (CCP-PROF).

#### 7.1.1 Version Number(s)

The GPO-CA shall issue X.509 v3 certificates (populate version field with integer "2").

#### 7.1.2 Certificate Extensions

For all CAs, use of standard certificate extensions shall comply with [RFC 3280].

Certificates issued by the GPO-CA shall comply with *Federal Public Key Infrastructure X.509 Certificate and CRL Extensions Profile* [FPKI-Prof].

CA certificates issued by the GPO-CA and GPO PKI CAs shall not include critical private extensions

Critical private extensions may only be used in Subscriber certificates, and if used, shall be interoperable (that is, not impair interoperability) within their intended community of use.

#### 7.1.3 Algorithm Object Identifiers

Certificates issued under this CP shall use the following OIDs for signatures:

sha-256WithRSAEncryption	{iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-1(1) 11}
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Certificates under this CP shall use the following OIDs for identifying the algorithm for which the subject key was generated:

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RsaEncryption	{iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-1(1) 1 }
Dhpublicnumber	{iso(1) member-body(2) us(840) ansi-x942(10046) number-type(2) 1 }

#### **7.1.4 Name Forms**

Where required as set forth above, the subject and issuer fields of the base certificate shall be populated with an X.500 Distinguished Name, with the attribute type as further constrained by RFC3280.

#### **7.1.5 Name Constraints**

The GPO-CA shall assert name constraints in certificates it issues.

#### **7.1.6 Certificate Policy Object Identifier**

Certificates issued under this CP shall assert the OID appropriate to the level of assurance with which it was issued.

#### **7.1.7 Usage of Policy Constraints Extension**

The GPO-CA may optionally assert policy constraints in CA certificates. This shall be documented and specified in detail in the CPS, if it is employed.

#### **7.1.8 Policy Qualifiers Syntax and Semantics**

Certificates issued under this CP shall not contain policy qualifiers.

#### **7.1.9 Processing Semantics for the Critical Certificate Policy Extension**

Processing semantics for the critical certificate policy extensions issued to Subscribers that are used by the GPO-CA shall conform to the FPKI PROF.

#### **7.1.10 Inhibit Any Policy Extension**

The CAs may assert InhibitAnyPolicy in CA certificates. When present, this extension should be marked as noncritical\*, to support legacy applications that cannot process InhibitAnyPolicy. Skip Certs shall be set to 0, since certificate policies are required in the Federal PKI. (\*Note: The recommended criticality setting is different from RFC 5280.)

## **7.2 CRL PROFILE**

### **7.2.1 Version Number(s)**

The GPO-CA shall issue X.509 version two (2) CARLs/CRLs. The CRL shall always populate the nextUpdate field.

### **7.2.2 CARL and CRL Entry Extensions**

Detailed CARL/CRL profiles covering the use of each extension are available in FPKI PROF. For the GPO-CA and all GPO subordinate CAs, CRL extensions shall conform to [FPKI-PROF].

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## **7.3 OCSP PROFILE**

Certificate Status Servers operating under this CP shall sign responses using algorithms designated for CRL signing.

The CSS shall be able to process SHA-1 hash values if they are included in the CertID field and the KeyHash in the responder ID field, and the CSS for the GPO-CA shall be configured for this.

### **7.3.1 Version Number(s)**

The GPO-CA shall issue Version 1 OCSP.

### **7.3.2 OCSP Extensions**

There shall be no critical OCSP extensions in the OCSP Profile issued by the GPO-CA.

## **8. COMPLIANCE AUDIT AND OTHER ASSESSMENTS**

GPO CAs shall have a compliance audit mechanism in place to ensure that the requirements of the GPO CP (which is compliant with FBCA CP and Federal Common Policy Framework CP) are being implemented and enforced. The GPO-CA and all GPO CAs are subject to an annual review by the FPKIPA to ensure its policies and operations remain consistent with the policy mappings in the certificate issued to the GPO by the FBCA.

### **8.1 FREQUENCY OR CIRCUMSTANCES OF ASSESSMENT**

The GPO CAs (including CSS components) and RAs shall be subject to a periodic compliance audit/assessment which is no less frequent than once per year.

The GPO-CA has the right to require periodic and aperiodic compliance audits or inspections of CA or RA operations to validate that the entities are operating in accordance with the security practices and procedures described in their respective CPS. Further, the GPO-PA has the right to require aperiodic compliance audits of CAs. The GPO-PA shall state the reason for any aperiodic compliance audit.

Assessments shall take place upon on the initial activation of a new CA (a brand new CA or new DN for a CA) and once every 12 months thereafter in accordance with federal PKI Common Policy, FBCA CP and GPO CP requirements.

The compliance audit of CAs and RAs shall be carried out in accordance with the requirements as specified in the FPKI Annual Review Requirements document located at <https://www.idmanagement.gov/wp-content/uploads/sites/1171/uploads/annual-review-requirements.pdf> .

### **8.2 IDENTITY/QUALIFICATIONS OF ASSESSOR**

The assessor or compliance auditor must perform PKI compliance audits as a regular ongoing business activity. The auditor must be a certified information system auditor (CISA) or IT security specialist (such as a certified information systems security professional or CISSP), and a PKI subject matter specialist who can offer input regarding acceptable risks, mitigation strategies, and industry best practices.

The GPO PA will have the responsibility to verify that the assessor or compliance auditor selected, by the GPO-OA, to audit the GPO PCA and any applicable personnel meet the requirements governing the identity and qualifications of the assessor/compliance auditor that are stipulated in this CP.

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### **8.3 ASSESSOR'S RELATIONSHIP TO ASSESSED ENTITY**

The compliance auditor shall be either a private firm, that is independent from the GPO-CA being audited (including all CAs and RAs), or it shall be sufficiently organizationally separated from the GPO-CA and GPO PKI to provide an unbiased, independent evaluation. An example of the latter situation may be the GPO Inspector General. To insure independence and objectivity, the compliance auditor may not have served the GPO-CA in developing or maintaining the entity's CA Facility or certificate practices statement.

### **8.4 TOPICS COVERED BY ASSESSMENT**

The compliance audit verifies that the operational and technical controls used by the GPO-CA operations personnel, including all RA's, satisfy all requirements of this CP, the GPO CPS, the FBCA CP, and the Federal PKI Common Policy, as well as any MOA's between the GPO-CA and any other PKI or entity. All aspects of the GPO-CA operation as specified in the GPO-CA CPS shall be subject to compliance audit inspections.

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Components other than CAs may be audited fully or by using a representative sample. If the auditor uses statistical sampling, all GPO PKI components, GPO PKI component managers and all operators and RA's shall be considered in the sample. The samples shall vary on an annual basis.

A full compliance audit for the TRCA or subordinate CAs covers all aspects within the scope identified above.

### **8.5 ACTIONS TAKEN AS A RESULT OF DEFICIENCY**

When the compliance auditor finds a discrepancy between how the GPO-CA is designed or is operated or maintained, as compared to the requirements of the GPO CP and/or Federal PKI CP, or with any MOA's or applicable CPS, the following actions shall be performed:

- the compliance auditor shall document the discrepancy
- the compliance auditor shall notify the GPO PKI PA and Operational Authority promptly
- The GPO PKI PA and OA shall promptly determine what further actions are necessary to meet the requirements of the GPO CP, Federal PKI FBCA CP and Common Policy Framework, GPO-CA CPS, and any relevant MOA's. The GPO PKI PA and OA shall make any such required notifications and take such actions without delay. The GPO PA may require a special compliance audit to confirm the implementation and effectiveness of the remedy.
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## **8.6 COMMUNICATION OF RESULT**

The compliance auditor will communicate results of all compliance audits to the GPO PA through a Compliance Audit Report letter. The letter shall be prepared to include the requirements in the “FPKI Compliance Audit Requirements” document and shall include an assertion by the GPO PA and OA that all GPO PKI components have been audited - including any components that may be separately managed and operated. This report letter shall document the versions of the CP and CPS used in the compliance audit. A copy of this Compliance Audit Report letter shall be communicated by the GPO PA to the federal PKI PA and to any other appropriate parties in accordance with established MOA’s and contractual obligations. Additionally, where necessary, the results of the compliance audit shall be communicated by the GPO PA as described in section 8.5 above.

A special compliance audit shall be conducted if it is required to confirm the implementation and effectiveness of the remedy to any deficiencies documented by the compliance auditor. The federal PKI Policy Authority can determine that such a special compliance audit is required to verify implementation and effectiveness of the remedy, and the GPO PA can do so as well.

On an annual basis, the GPO OA shall submit an audit compliance annual review package to the FPKIPA. This package shall be prepared in accordance with the “Compliance Audit Requirements” FPKI Annual Review Requirements document and includes an assertion from the GPO PA or OA that all GPO PKI components have been audited - including any components that may be separately managed and operated. The package shall identify the versions of the CP and CPS used in the assessment. Additionally, where necessary, the results shall be communicated as set forth in Section 8.5 above.

## **9. OTHER BUSINESS AND LEGAL MATTERS**

### **9.1 FEES**

#### **9.1.1 Certificate Issuance or Renewal Fees**

GPO may charge fees for certificate issuance and renewal and these fees shall be set by GPO and documented with Subscribers.

#### **9.1.2 Certificate Access Fees**

There are no charges for access to the GPO-CA certificate or to Subscriber certificates.

### **9.1.3 Revocation or Status Information Access Fees**

There are no charges for access to Revocation, CRL or CSS Status information.

### **9.1.4 Fees for Other Services**

GPO reserves the right to set fees in accordance with this CP and MOA's for other services provided by the GPO-CA.

### **9.1.5 Refund Policy**

Refunds are subject to a case by case review by the GPO PA and the Subscriber's organization.

## **9.2 FINANCIAL RESPONSIBILITY**

Organizations that are acting as Relying Parties, shall determine what financial limits, if any, they wish to impose for certificates used to consummate a transaction. Acceptance of a Medium Assurance or Medium-Hardware Assurance Level certificate is entirely at the discretion of the organization acting as a Relying Party and is likely to depend upon several factors such as, the likelihood of fraud, other procedural controls, organization-specific policy, or statutorily imposed constraints.

### **9.2.1 Insurance Coverage**

There shall be no insurance coverage for any non-GPO entity or external party, or any Relying Party.

### **9.2.2 Other Assets**

Not applicable.

### **9.2.3 Insurance or Warranty Coverage for End-Entities**

There is no insurance coverage or warranty coverage of any kind for end-entities or for relying parties offered by the GPO-CA.

### **9.3 CONFIDENTIALITY OF BUSINESS INFORMATION**

GPO-CA information not requiring protection may be made publicly available, subject to the stipulations of this CP and any applicable MOA.

#### **9.3.1 Scope of Confidential Information**

Each Subscriber's private signing key is confidential to that Subscriber. The CA and RA are not provided any access to those keys.

Information held in audit logs and the archives is considered confidential to the GPO-CA and is not released to external parties (with the exception of the approved/authorized independent Compliance Auditor per section 8 of this CP), unless required by law.

Personal information held by the RA, other than that which is explicitly published as part of a certificate, CRL, this CP or the CPS, is considered confidential to the GPO PKI and is not released unless required by law.

Information stored on the RA workstation or GPO-CA server is protected by password. The RA keeps paper information (e.g., registration forms) in a locked container when the RA is not present.

#### **9.3.2 Information not within the Scope of Confidential Information**

Information included in certificates and CRLs issued by the GPO-CA are not considered confidential, with the exception of the UUID or FASC-N value in the subject alternative name extension in all GPO Authentication certificates.

#### **9.3.3 Responsibility to Protect Confidential Information**

The GPO-CA PA and OA shall have responsibility to ensure that controls exist to protect the confidential information in section 9.3.1.

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## **9.4 PRIVACY OF PERSONAL INFORMATION**

### **9.4.1 Privacy Plan**

A Privacy Impact Assessment (PIA) for the GPO-CA shall be produced by GPO and shall involve the GPO Privacy Officer. The PIA shall be made available to the compliance auditor and the Federal PKI Policy Authority. If deemed necessary by the GPO PA, a Privacy Plan shall be produced and implemented in accordance with GPO policies.

### **9.4.2 Information Treated as Private**

Information held in the GPO-CA audit logs and the GPO-CA archives is considered private and shall not be released to external parties (with the exception of the approved/authorized independent Compliance Auditor per section 8 of this CP), unless required by law. The GPO-CA shall protect all subscriber personally identifying information (PII) from unauthorized disclosure.

The collection of PII by the GPO-CA shall 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 shall 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 shall not be used for any other purpose.

### **9.4.3 Information Not Deemed Private**

Information included in certificates and CRLs issued by the GPO-PCA are not considered confidential

### **9.4.4 Responsibility to Protect Private Information**

The GPO-CA PA and OA shall have responsibility to ensure that controls are in force and operational to securely store and protect the private information discussed in section 9.4. All information collected as part of the identity proofing process shall be protected to ensure confidentiality and integrity. In the event the GPO-CA Entity were to terminate PKI activities, it shall be responsible for disposing of or destroying sensitive information, including PII, in a secure manner, and maintaining its protection from unauthorized access until destruction.

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### **9.4.5 Notice and Consent to Use Private Information**

There are no requirements for the GPO-CA to provide notice or obtain consent to use the information provided by Subscribers and applicants for certificates.

### **9.4.6 Disclosure Pursuant to Judicial or Administrative Process**

The GPO PA is the responsible party to review all requests for information release as part of civil discovery and, working with the GPO Policy Authority and the GPO General Counsel shall ensure that no private information or GPO-CA information is disclosed unless required by US federal law or ordered by a court with valid jurisdiction.

The GPO PA keeps copies, either paper or electronic, of each request for information release pursuant to judicial or administrative process, and to law enforcement officials.

### **9.4.7 Other Information Disclosure Circumstances**

None.

## **9.5 INTELLECTUAL PROPERTY RIGHTS**

The GPO PA and OA shall comply with intellectual property rights.

All Certificates and CRLs issued by the GPO-CA are the property of the GPO-CA. This CP is the property of the GPO-CA. The Distinguished Names (DNs) for GPO entities within the GPO-CA domain in the directory and in certificates issued to GPO entities within that domain are the property of GPO. The DN for non-GPO entities are subject to the MOA between the entity and GPO.

With respect to licensed applications, this CP does not modify ownership of licensed applications or licensing agreements for such applications.

## **9.6 REPRESENTATIONS AND WARRANTIES**

### **9.6.1 CA Representations and Warranties**

The GPO-CA (GPO PCA) and GPO SCA (Subordinate CA), which issue certificates that assert this GPO CP, shall comply with the requirements set forth in any MOAs that may be

appropriately executed. The GPO-CA shall make GPO certificates and CRLs available in a repository for subscribers, PKI administrators and Relying Parties use.

The GPO-CA may use a variety of mechanisms for posting information into a repository as required by this CP. These mechanisms at a minimum shall include:

- All CA certificates and CRL's shall be placed into a X.500 Directory Server System that is publicly accessible through the Lightweight Directory Access Protocol (LDAP)
- All CA certificates and CRL's shall also be available and publicly accessible via the Hyper Text Transport Protocol (HTTP)
- The GPO-CA may optionally publish subscriber certificates into the publicly accessible X.500 Directory Server System that is publicly accessible through LDAP protocol
- Availability of the information as required by the certificate information posting and retrieval stipulations of this CP
- Access control mechanisms when needed to protect repository information from unauthorized modification or deletion (as described in later sections)
- There shall be redundant directory systems (a total of 3 directory systems for triple redundancy) at the primary operational site and in addition, redundant directory systems at the off-site backup operational site (a total of 3 directory systems for triple redundancy at the off-site backup location) so that the GPO-CA can achieve the Common Policy directory availability requirements.
- The publicly accessible directory systems and LDAP and HTTP access mechanisms shall be operated and maintained to comply with this CP for overall availability, and the scheduled downtime for these systems will be limited to ensure that the requirements of this CP are met at all times
  - The schedule downtime requirements in this CP are met by tracking all scheduled downtime in GPO PKI Change Control Records and ensuring that one of the redundant systems is always planned to be online and active, to avoid any downtime while other redundant systems might undergo scheduled maintenance or problem resolution.

## 9.6.2 RA Representations and Warranties

The RA will abide by all obligations for all GPO CP obligations, and shall also abide by this CP. The RA shall ensure that the cryptographic module shall not left unattended once the private key is activated, in order to ensure that unauthorized access to the private key does not occur.

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RA's shall conform to the stipulations of this CP including:

- Maintaining RA operations in conformance with this CP
- 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 via the Subscriber Agreement, and that Subscribers are informed of the consequences of not complying with the obligations contained in the Subscriber Agreement and this CP (by informing Subscribers that their certificate can be revoked for non-compliance with the Subscriber Agreement and this CP).

RA's that are found to have acted in a manner inconsistent with these obligations in this CP shall be subject to revocation of RA responsibilities.

### **9.6.3 Subscriber Representations and Warranties**

Subscribers shall agree to the following:

Accurately represent themselves in all communications with the GPO CA authorities and representatives.

Protect their private keys at all times, in accordance with this policy, as stipulated in their certificate acceptance agreements and local procedures.

Promptly notify the GPO CA upon suspicion of loss or compromise of their private keys. Such notification shall be made directly or indirectly through mechanisms consistent with the GPO CA's CPS.

Abide by all the terms, conditions, and restrictions levied on the use of their private keys and certificates in the GPO CA Subscriber agreement, including requirements for protecting the private key and use of certificates.

### **9.6.4 Relying Parties Representations and Warranties**

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This CP (as well as the US federal Common Policy) does not specify what steps a Relying Party should take to determine whether to rely upon a certificate. The Relying Party decides, pursuant to its own policies, what steps to take. The GPO-CA provides the tools needed to perform the trust path creation, validation, and certificate policy mappings which the Relying Party may wish to employ in its determination. The GPO-CA shall make GPO certificates and CRL's available in a repository and shall also make certificate status available via OCSP so that Relying Parties may obtain GPO certificates and CRL's for Relying Party use (pursuant to Relying Party policies).

The Relying Party must determine if the certificates issued under the GPO-CA are appropriate for their application. This may be determined by evaluating various risk factors including the value of the information, the threat environment, and the existing protection of the information environment. These determinations are made by the Relying Party and are not controlled by the GPO-PA or the GPO-OA.

### **9.6.5 Representations and Warranties of Other Participants**

Not applicable.

### **9.7 DISCLAIMERS OF WARRANTIES**

The GPO-CA does not disclaim any responsibilities required by the GPO Certificate Policy.

### **9.8 LIMITATIONS OF LIABILITY**

The GPO shall not liable to any party with respect to the operations of the GPO-CA except in accordance with federal law, or through a valid express written contract between GPO and another party.

In no event will the GPO be liable for any losses, including direct or indirect, incidental, consequential, special, or punitive damages, arising out of or relating to any certificate issued by or revoked by, or not revoked by, the GPO-CA.

Certificates are issued and revoked at the sole discretion of the GPO-PA. When the GPO-CA issues a cross-certificate, it does so for the convenience of the GPO and in compliance with the provisions of the GPO CP. The Entity must determine whether the GPO CP meets the Entity's legal and policy requirements. Review of an Entity's CP by the GPO is not a substitute for due care and mapping of the CP by the Entity, including Relying Parties.

## **9.9 INDEMNITIES**

Not applicable.

## **9.10 TERM AND TERMINATION**

### **9.10.1 Term**

This CP becomes effective when approved by the GPO PA and OA. There is no specified term for this CP.

### **9.10.2 Termination**

Termination of this CP is at the discretion of the GPO PA. The Federal PKI Policy Authority shall be notified by email and telephone if this CP is terminated.

### **9.10.3 Effect of Termination and Survival**

The effects of this CP apply until the end of the archive period of the last certificate issued by the GPO-CA.

## **9.11 INDIVIDUAL NOTICES AND COMMUNICATION WITH PARTICIPANTS**

The GPO PA shall notify and communicate with participants via instructions and methods contained in MOA's.

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For any planned change to the GPO PKI or GPO CA infrastructure that has the potential to affect the FPKI operational environment, the GPO PA shall communicate the planned change to the FPKIPA at least two (2) weeks prior to the implementation, and 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 GPO PA shall review this CP at least annually. Corrections or changes to this CP shall be made available to all Subscribers and Participants, via publication of the CP on the Internet at the GPO PKI web site (<http://www.gpo.gov/projects/pki.htm>).

Suggested changes to this CP may be provided to the Contact Person listed in section 1.5.2 of this CP. Such suggested change must include a description of the change, a justification for why the change should be implemented and contact information for the requestor.

### **9.12.2 Notification Mechanism and Period**

Changes to this CP shall be communicated to the Federal PKI Policy Authority (FPKIPA) in accordance with the MOA between the GPO and the FPKIPA. In addition, changes to this CP shall be communicated to all non-GPO agencies that have an MOA in effect with the GPO PA via electronic mail (email) to the contact person listed in the MOA.

### **9.12.3 Circumstances under which OID must be Changed**

An OID will be changed if the GPO PA determines that the assurance level of the certificates do not meet the GPO CP.

## **9.13 DISPUTE RESOLUTION PROVISIONS**

The GPO-PA shall resolve any disputes associated with the use of the GPO-CA or certificates issued by the GPO-CA.

## **9.14 GOVERNING LAW**

The terms and provisions of this CP shall be interpreted under and governed by applicable Federal law.

## **9.15 COMPLIANCE WITH GOVERNING LAW**

The GPO PKI, PA, OA and this CP shall comply with federal law.

## **9.16 MISCELLANEOUS PROVISIONS**

### **9.16.1 Entire Agreement**

Not applicable.

### **9.16.2 Assignment**

Not applicable.

### **9.16.3 Severability**

Should it be determined that any relevant section of this Certificate Policy is incorrect or invalid, all other parts of the CP shall remain in effect until such time as the CP can be updated. The process for updating the CP is described in section of 9.12 of this CP.

### **9.16.4 Enforcement (Attorney's Fees and Waiver of Rights)**

Not applicable.

### **9.16.5 Force Majeure**

Not applicable.

## **9.17 OTHER PROVISIONS**

Not applicable.

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## 10. BIBLIOGRAPHY

The following documents were used in part to develop this CP:

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<http://www.abanet.org/scitech/ec/isc/dsgfree.html>
- AUDIT        FPKI Annual Review Requirements  
<https://www.idmanagement.gov/wp-content/uploads/sites/1171/uploads/annual-review-requirements.pdf>
- CCP-PROF    X.509 Certificate and Certificate Revocation List (CRL) Extensions Profile for the Shared Service Providers (SSP) Program.  
<http://www.cio.gov/fpkipa/documents/CertCRLprofileForCP.pdf>
- FIPS 112     Password Usage, 1985-05-30  
<http://csrs.nist.gov/>
- FIPS 140-1   Security Requirements for Cryptographic Modules, 1994-01  
<http://csrs.nist.gov/fips/fips1401.htm>
- FIPS 140-2   Security Requirements for Cryptographic Modules, 2001-06  
<http://csrc.nist.gov/publications/fips/fips140-2/fips1402.pdf>
- FIPS 180-1   Secure Hash Standard, 1995-04  
<http://csrc.nist.gov/publications/fips/fips180-1/fip180-1.pdf>
- FIPS 180-2   Secure Hash Standard, 2002-08  
<http://csrc.nist.gov/publications/fips/fips180-1/fip180-1.pdf>
- FIPS 186     Digital Signature Standard, 1994-05-19  
<http://csrs.nist.gov/fips/fips186.pdf>
- FIPS 186-2   Digital Signature Standard, 2000-01  
<http://csrc.nist.gov/publications/fips/fips186-2/fips186-2-change1.pdf>
- FPKI-PROF   *Federal Public Key Infrastructure X.509 Certificate and CRL Extensions Profile* [FPKI-Prof].
- FOIACT      5 U.S.C. 552, Freedom of Information Act.  
<http://www4.law.cornell.edu/uscode/5/552.html>
- ISO9594-8   Information Technology-Open Systems Interconnection-The Directory: Authentication Framework, 1997.  
<ftp://ftp.bull.com/pub/OSIdirectory/ITU/97x509final.doc>
- ITMRA        40 U.S.C. 1452, Information Technology Management Reform Act of 1996.  
<http://www4.law.cornell.edu/uscode/40/1452.html>

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- NAG69C Information System Security Policy and Certification Practices Statement for Certification Authorities, rev C, November 1999.
- NSD42 National Policy for the Security of National Security Telecom and Information Systems, 5 Jul 1990.  
[http://snyside.sunnyside.com/cpsr/privacy/computer\\_security/nsd\\_42.txt](http://snyside.sunnyside.com/cpsr/privacy/computer_security/nsd_42.txt)  
(redacted version)
- NS4005 NSTISSI 4005, Safeguarding COMSEC Facilities and Material, August 1997.
- NS4009 NSTISSI 4009, National Information Systems Security Glossary, January 1999.
- PKCS#12 Personal Information Exchange Syntax Standard, April 1997.  
<http://www.rsa.com/rsalabs/pubs/PKCS/html/pkcs-12.html>
- RFC 2510 Certificate Management Protocol, Adams and Farrell, March 1999.
- RFC 2527 Certificate Policy and Certificate Practices Framework, Chokhani and Ford, March 1999.  
Security Requirements for Certificate Issuing and Management Components, 3 November 1999, Draft  
Digital Signatures, W. Ford  
  
United States Department of Defense X.509 Certificate Policy, Version 5.0, 13 December 1999

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## 11. ACRONYMS AND ABBREVIATIONS

CA	Certification Authority
CARL	Certificate Authority Revocation List
COMSEC	Communications Security
COTS	Commercial Off-the-Shelf
CP	Certificate Policy
CCP-PROF	X.509 Certificate and Certificate Revocation List (CRL) Extensions Profile for the US Federal PKI Shared Service Providers (SSP) Program.
CPS	Certification Practices Statement
CRL	Certificate Revocation List
CSOR	Computer Security Object Registry
DN	Distinguished Name
DSA	Digital Signature Algorithm
DSS	Digital Signature Standard
ERC	Enhanced Reliability Check
FAR	Federal Acquisition Regulations
FBCA	Federal Bridge Certification Authority
FBCA Operational Authority	Federal Bridge Certification Authority Operational Authority
FED-STD	Federal Standard
FIPS PUB	(US) Federal Information Processing Standard Publication
FPKI	Federal Public Key Infrastructure
FPKISC	Federal PKI Steering Committee

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FPKIPA	Federal PKI Policy Authority
GPEA	Government Paperwork Elimination Act of 1998
GPO-CA	Government Printing Office Certification Authority
GPO-CA Operational Authority	Government Printing Office Certification Authority Operational Authority
IETF	Internet Engineering Task Force
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
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).
MOA	Memorandum of Agreement (as used in the context of this CP, between an Entity and the GPO-PA allowing interoperation between the GPO-CA and Entity CA, such as the Federal PKI Trust Infrastructure, including the Federal Bridge CA)
NIST	National Institute of Standards and Technology
NSA	National Security Agency
NSTISSI	National Security Telecommunications and Information Systems Security Instruction
OID	Object Identifier

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PIN	Personal Identification Number
PKCS	Public Key Certificate Standard
PKI	Public Key Infrastructure
PKIX	Public Key Infrastructure X.509
RA	Registration Authority
RFC	Request For Comments
RSA	Rivest-Shamir-Adleman (encryption algorithm)
SHA-1	Secure Hash Algorithm, Version 1
SHA-256	Secure Hash Algorithm, 256 bit version
S/MIME	Secure Multipurpose Internet Mail Extension
SSL	Secure Sockets Layer
TSDM	Trusted Software Development Methodology
UPS	Uninterrupted Power Supply
URL	Uniform Resource Locator
U.S.C.	United States Code
VME	Virtual Machine Environment
WWW	World Wide Web

## 12. GLOSSARY

Access	Ability to make use of any information system (IS) resource. [NS4009]
Access Control	Process of granting access to information system resources only to authorized users, programs, processes, or other systems. [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. [NS4009]
Activation Data	Private data, other than keys, that are required to access cryptographic modules (i.e., unlock private keys for signing or decryption events).
Agency	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.
Agency CA	A CA that acts on behalf of an Agency, and is under the operational control of an Agency.
Applicant	The subscriber is sometimes also called an "applicant" after applying to a certification authority for a certificate, but before the certificate issuance procedure is completed. [ABADSG footnote 32]

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Archive	Long-term, physically separate storage.
Attribute Authority	An entity, recognized by the Federal PKI Policy Authority or comparable Agency 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 Data	Chronological record of system activities to enable the reconstruction and examination of the sequence of events and changes in an event. [NS4009, "audit trail"]
Authenticate	To confirm the identity of an entity when that identity is presented.
Authentication	Security measure designed to establish the validity of a transmission, message, or originator, or a means of verifying an individual's authorization to receive specific categories of information. [NS4009]
Backup	Copy of files and programs made to facilitate recovery if necessary. [NS4009]
Binding	Process of associating two related elements of information. [NS4009]
Biometric	A physical or behavioral characteristic of a human being.
Certificate	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

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	authority issuing it. [ABADSG]. 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.
Certification Authority (CA)	An authority trusted by one or more users to issue and manage X.509 Public Key Certificates and CARLs or CRLs.
Certificate Authority Revocation List (CARL)	A signed, time-stamped list of serial numbers of CA public key certificates, including cross-certificates, that have been revoked.
CA Facility	The collection of equipment, personnel, procedures and structures that are used by a Certification Authority to perform certificate issuance and revocation.
Certificate	A digital representation of information which at least (1) identifies the certification authority issuing it, (2) names or identifies it’s Subscriber, (3) contains the Subscriber’s public key, (4) identifies it’s operational period, and (5) is digitally signed by the certification authority issuing it. [ABADSG]
Certificate Management Authority (CMA)	A Certification Authority or a Registration Authority.
Certification Authority Software	Key Management and cryptographic software used to manage certificates issued to subscribers.
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,

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such policies and associated enforcement technology can support provision of the security services required by particular applications.

Certification Practices 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 that it has issued and that are revoked prior to their stated expiration date.
Certificate Status Authority	A trusted entity that provides on-line verification to a Relying Party of a subject certificate's trustworthiness, and may also provide additional attribute information for the subject certificate.
Client (application)	A system entity, usually a computer process acting on behalf of a human user, that makes use of a service provided by a server.
Commercial Off-the-Shelf	A product, either hardware or software or both, that is a commercial product supported by a vendor in business for the purpose of selling and maintaining this product to service market commercial needs, including federal government needs.
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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Component Private Key	Private key associated with a function of the certificate issuing equipment, as opposed to being associated as opposed to being associated with an operator or administrator.
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]
Cross-Certificate	A certificate used to establish a trust relationship between two Certification Authorities.
Cryptographic Module	The set of hardware, software, firmware, or some combination thereof that implements cryptographic logic or processes, including cryptographic algorithms, and is contained within the cryptographic boundary of the module. [FIPS140]
Cryptoperiod	Time span during which each key setting remains in effect. [NS4009]
Custodial Subscriber Key Stores	Custodial Subscriber Key Stores holds keys for a number of Subscriber certificates in one location.
Data Integrity	Assurance that the data are unchanged from creation to reception.

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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.
Dual Use Certificate	A certificate that is intended for use with both digital signature and data encryption services.
Duration	A field within a certificate that is composed of two subfields: "date of issue" and "date of next issue".
E-commerce	The use of network technology (especially the internet) to buy or sell goods and services.
Employee	Any person employed by an organization as defined above.
Encrypted Network	A network that is protected from outside access by NSA approved high-grade (Type I) cryptography. Examples are SIPRNET and TOP SECRET networks.
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	Relying Parties and Subscribers.
Entity	For purposes of this CP, Entity is any person, organization, corporation, or government (state, local, federal, or foreign) operating, or directing the operation of, one or more CAs.

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Entity CA	A CA that acts on behalf of an Entity, and is under the operational control of an Entity. For this CP, this would be a non-GPO CA. For this CP, the only Entity CA the GPO CA interacts with is the Federal PKI Trust Infrastructure, including the Federal Bridge CA.
Federal Bridge Certification Authority (FBCA)	The Federal Bridge Certification Authority consists of a collection of Public Key Infrastructure components (Certificate Authorities, Directories, Certificate Policies and Certification Practices Statements) that are used to provide peer-to-peer interoperability among Agency Principal Certification Authorities.
Federal Bridge Certification Authority Membrane	The Federal Bridge Certification Authority Membrane consists of a collection of Public Key Infrastructure components including a variety of Certification Authority PKI products, Databases, CA specific Directories, Border Directory, Firewalls, Routers, Randomizers, etc.
FBCA Operational Authority	The Federal Bridge Certification Authority Operational Authority is the organization selected by the Federal Public Key Infrastructure Policy Authority to be responsible for operating the Federal Bridge Certification Authority.
Federal Public Key Infrastructure Policy Authority (FPKI PA)	The Federal PKI Policy Authority is a federal government body responsible for setting, implementing, and administering policy decisions regarding interagency PKI interoperability that uses the FBCA.
Firewall	Gateway that limits access between networks in accordance with local security policy. [NS4009]

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Government Printing Office Certification Authority (GPO-CA)	The Government Printing Office Certification Authority consists of a collection of Public Key Infrastructure components (Certificate Authorities, Directories, Certificate Policies and Certification Practices Statements) that are used to provide peer-to-peer interoperability among Other Certification Authorities.
GPO-CA Operational Authority	The Government Printing Office Certification Authority Operational Authority is the organization selected by the Government Printing Office Policy Authority to be responsible for operating the Government Printing Office Certification Authority.
High Assurance Guard (HAG)	An enclave boundary protection device that controls access between a local area network that an enterprise system has a requirement to protect, and an external network that is outside the control of the enterprise system, with a high degree of assurance.
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.
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. [NS4009]
Inside threat	An entity with authorized access that has the potential to harm an information system through destruction, disclosure, modification of data, and/or denial of service.
Integrity	Protection against unauthorized modification or destruction of information. [NS4009]. 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

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usage and/or representation.

Intermediate CA	A CA that is subordinate to another CA, and has a CA subordinate to itself.
Key Escrow	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 Exchange	The process of exchanging public keys in order to establish secure communications.
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 (1) 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.
Local Registration Authority (LRA)	A Registration Authority with responsibility for a local community.
Memorandum of Agreement (MOA)	Agreement between the GPO PKI Policy Authority and an Entity allowing interoperability between the Entity CA and the GPO-CA.
Mission Support Information	Information that is important to the support of deployed and contingency forces.

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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]
Non-Repudiation	Assurance that the sender is provided with proof of delivery and that the recipient is provided with proof of the sender's identity so that neither can later deny having processed the data. [NS4009] 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. Legal non-repudiation refers to how well possession or control of the private signature key can be established.
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 uniquely identify each of the four policies and cryptographic algorithms supported.
Out-of-Band	Communication between parties utilizing a means or method that

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	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	Fills the role of a Subscriber for non-human system components that are named as public key certificate subjects, and is responsible for meeting the obligations of Subscribers as defined throughout this CP.
Policy Management Authority (PMA)	Body established to oversee the creation and update of Certificate Policies, review Certification Practices Statements, review the results of CA audits for policy compliance, evaluate non-domain policies for acceptance within the domain, and generally oversee and manage the PKI certificate policies. For the FBCA, the PMA is the Federal PKI Policy Authority.
Principal CA (PCA)	The Principal CA is a CA designated by an Agency, for this CP GPO, to interoperate with the Entity CAs.
Privacy	Restricting access to subscriber or Relying Party information in accordance with Federal law and Organization policy.
Private Key	(1) The key of a signature key pair used to create a digital signature. (2) The key of an encryption key pair that is used to decrypt confidential information. In both cases, this key must be kept secret.

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Public Key	(1) The key of a signature key pair used to validate a digital signature. (2) The key of an encryption key pair that is used to encrypt confidential information. In both cases, this key is made publicly available normally in the form of a digital certificate.
Public Key Infrastructure (PKI)	A set of policies, processes, server platforms, software and workstations 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 that is responsible for identification and authentication of certificate subjects, but that does not sign or issue certificates (i.e., a Registration Authority is delegated certain tasks on behalf of an authorized CA).
Re-key (a certificate)	To change the value of a cryptographic key that is being used in a cryptographic system application; this normally entails issuing a new certificate on the new public key.
Relying Party	A person or Agency who has received information that includes a certificate and a digital signature verifiable with reference to a public key listed in the certificate, and is in a position to rely on them.
Renew (a certificate)	The act or process of extending the validity of the data binding asserted by a public key certificate by issuing a new certificate.
Repository	A database containing information and data relating to certificates as specified in this CP; may also be referred to as a directory.
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.

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Revoke a Certificate	To prematurely end the operational period of a certificate effective at a specific date and time.
Risk	An expectation of loss expressed as the probability that a particular threat will exploit a particular vulnerability with a particular harmful result.
Risk Tolerance	The level of risk an entity is willing to assume 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.
Secret Key	A “shared secret” used in symmetric cryptography, wherein users are authenticated based on a password, Personal Identification Number (PIN), or other information shared between the user and the remote host or server. A single key is shared between two parties: the sender, to encrypt a transmission, and the recipient, to decrypt the transmission, with the shared key being generated with an algorithm agreed to beforehand by the transacting parties.
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.
Subordinate CA (SCA)	<p>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).</p> <p>Additionally, this CP may refer to CAs that are “subordinate” to the</p>

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	<p>PCA. The use of this term shall encompass any CA under the control of the PCA that has a certificate issued to it by the PCA or any CA subordinate to the PCA, whether or not a hierarchical or other PKI architecture is used.</p>
Subscriber	<p>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 or network device</p> <p>CAs are sometimes technically considered “subscribers” in a PKI. 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.</p>
Superior CA	<p>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).</p>
Supervised Remote Identity Proofing	<p>A real-time identity proofing event where the RA/Trusted Agent is 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 when utilized for PIV-I credential issuance.</p>
System Equipment Configuration	<p>A comprehensive accounting of all system hardware and software types and settings.</p>
System High	<p>The highest security level supported by an information system. [NS4009]</p>
Technical non-repudiation	<p>The contribution public key mechanisms to the provision of</p>

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	technical evidence supporting a non-repudiation security service.
Threat	Any circumstance or event with the potential to cause harm to an information system in the form of destruction, disclosure, adverse modification of data, and/or denial of service. [NS4009]
Token	Hardware or software that contains or can be used to generate cryptographic keys. Examples of hardware tokens include smart cards and memory cards. Software tokens include both software cryptographic modules that store or generate keys and storage devices or messages that contain keys (e.g., PKCS #12 messages).
Trust List	Collection of trusted certificates used by Relying Parties to authenticate other certificates.
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 positive control material at all times by a minimum of two authorized individuals, each capable

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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 (in this case, a CA) 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. At this time, allowed VMEs are limited to Hypervisor type virtual environments. Other technology, such as Docker Containers, is not permitted.

Zeroize

A method of erasing electronically stored data by altering the contents of the data storage so as to prevent the recovery of the data. [FIPS140]

### **13. ACKNOWLEDGEMENTS**

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