CA/Browser Forum

Baseline Requirements for the Issuance and Management of Publicly-Trusted Certificates, v.1.2.~~2~~3

(Current through adoption of Ballot 13~~5~~4 on 16 October 2014)

Baseline Requirements for the Issuance and Management of Publicly-Trusted Certificates, v. 1.2.~~2~~3

This version 1.2.~~2~~ 3 represents the Baseline Requirements, as adopted by the CA/Browser Forum as of Ballot ~~134~~135, passed by the Forum on 16 October 2014.

These Baseline Requirements describe an integrated set of technologies, protocols, identity-proofing, lifecycle management, and auditing requirements that are necessary (but not sufficient) for the issuance and management of Publicly-Trusted Certificates; Certificates that are trusted by virtue of the fact that their corresponding Root Certificate is distributed in widely-available application software. The Requirements are not mandatory for Certification Authorities unless and until they become adopted and enforced by relying–party Application Software Suppliers.

Notice to Readers

This version of the Baseline Requirements for the Issuance and Management of Publicly-Trusted Certificates present criteria established by the CA/Browser Forum for use by Certification Authorities when issuing, maintaining, and revoking publicly-trusted Certificates. The Requirements may be revised from time to time, as appropriate, in accordance with procedures adopted by the CA/Browser Forum. Because one of the primary beneficiaries of these Requirements is the end user, the Forum openly invites anyone to make recommendations and suggestions by email to the CA/Browser Forum at questions@cabforum.org. The Forum members value all input, regardless of source, and will seriously consider all such input.

The CA/Browser Forum

The CA/Browser Forum is a voluntary organization of Certification Authorities and suppliers of Internet browser and other relying-party software applications. Membership as of October 2014 is as follows:

Certification Authorities

- Actalis
- ANF Autoridad de Certificación
- AS Sertifitseerimiskeskus
- Buypass AS
- Camerfirma
- Certinomis
- certSIGN
- Certum
- Chunghwa Telecom Co., Ltd.
- Comodo CA Ltd
- D-TRUST GmbH
- DigiCert, Inc.
- Digidentity BV
- Disig, a.s.
- E-TUGRA Inc.
- Entrust
- Firmaprofesional
- GlobalSign
- GoDaddy.com, Inc.
- Izenpe S.A.
- Kamu Sertifikasyon Merkezi
- KPN Corporate Market BV
- Logius PKIoverheid
- Network Solutions, LLC
- Open Access Technology International
- OpenTrust
- Prvni certifikacni autorita, a.s.
- QuoVadis Ltd.
- SECOM Trust Systems CO., Ltd.
- Shanghai Electronic CA Center Co. Ltd
- Skaitmeninio sertifikavimo centras (SSC)
- StartCom Certification Authority
- Swisscom (Switzerland) Ltd
- SwissSign AG
- Symantec Corporation
- Taiwan CA (TWCA)
- TrendMicro
- Trustis Limited
- Trustwave
- TURKTRUST
- Visa
- Wells Fargo Bank, N.A.
- WoSign

Relying-Party Application Software Suppliers

- 360 Browser
- Apple
- Google Inc.
- Microsoft Corporation
- Opera Software ASA
- The Mozilla Foundation

Other groups that have participated in the development of these Requirements include the AICPA/CICA WebTrust for Certification Authorities task force and ETSI ESI. Participation by such groups does not imply their endorsement, recommendation, or approval of the final product.

Document History

Ver.	Ballot	Description	Adopted	Effective*
1.0.0	62	Version 1.0 of the Baseline Requirements Adopted	22-Nov-11	01-Jul-12
1.0.1	71	Revised Auditor Qualifications	08-May-12	01-Jan-13
1.0.2	75	Non-critical Name Constraints allowed as exception to RFC 5280	08-Jun-12	08-Jun-12
1.0.3	78	Revised Domain/IP Address Validation, High Risk Requests, and Data Sources	22-Jun-12	22-Jun-12
1.0.4	80	OCSP responses for non-issued certificates	02-Aug-12	01-Feb-13 01-Aug-13
--	83	Network and Certificate System Security Requirements adopted	03-Aug-13	01-Jan-13
1.0.5	88	User-assigned country code of XX allowed	12-Sep-12	12-Sep-12
1.1.0	--	Published as Version 1.1 with no changes from 1.0.5	14-Sep-12	14-Sep-12
1.1.1	93	Reasons for Revocation and Public Key Parameter checking	07-Nov-12	07-Nov-12 01-Jan-13
1.1.2	96	Wildcard certificates and new gTLDs	20-Feb-13	20-Feb-13 01-Sep-13
1.1.3	97	Prevention of Unknown Certificate Contents	21-Feb-13	21-Feb-13
1.1.4	99	Add DSA Keys (BR v.1.1.4)	3-May-2013	3-May-2013
1.1.5	102	Revision to subject domainComponent language in section 9.2.3	31-May-2013	31-May-2013
1.1.6	105	Technical Constraints for Subordinate Certificate Authorities	29-July-2013	29-July-2013
1.1.7	112	Replace Definition of "Internal Server Name" with “Internal Name”	3-April-2014	3-April-2014
1.1.8	120	Affiliate Authority to Verify Domain	5-June-2014	5-June-2014
1.1.9	129	Clarification of PSL mentioned in section 11.1.3	4-Aug-2014	4-Aug-2014
1.2.0	125	CAA Records	14 Oct-2014	15-Apr-2015
1.2.1	118	SHA-1 Sunset	16-Oct-2014	16-Jan-2015 1-Jan-2016 1-Jan-2017
1.2.2	134	Application of RFC 5280 to Pre-certificates	16-Oct-2014	16-Oct-2014
1.2.3	135	ETSI Auditor Qualifications	16-Oct-2014	16-Oct-2014

* Effective Date and Additionally Relevant Compliance Date(s)

Implementers' Note: Version 1.1.6 of these SSL Baseline Requirements was published on July 29, 2013. Version 2.0 of WebTrust's Principles and Criteria for Certification Authorities - SSL Baseline with Network Security and ETSI's Electronic Signatures and Infrastructures (ESI) Technical Standard 102 042 incorporate version 1.1.6 of these Baseline Requirements and version 1.0 of the Network and Certificate System Security Requirements. The CA/Browser Forum continues to improve the Baseline Requirements while WebTrust and ETSI also continue to update their audit criteria. We encourage all CAs to conform to each revision herein on the date specified without awaiting a corresponding update to an applicable audit criterion. In the event of a conflict between an existing audit criterion and a guideline revision, we will communicate with the audit community and attempt to resolve any uncertainty, and we will respond to implementation questions directed to questions@cabforum.org. Our coordination with compliance auditors will continue as we develop guideline revision cycles that harmonize with the revision cycles for audit criteria, the compliance auditing periods and cycles of CAs, and the CA/Browser Forum's guideline implementation dates.

Relevant Compliance Dates

Compliance	Section(s)	Summary Description (See Full Text for Details)
2013-01-01	Appendix A, (4)	For RSA public keys, CAs SHALL confirm that the value of the public exponent is an odd number equal to 3 or more. (Appendix A – (4) General Requirements for Public Keys)
2013-01-01	13.2.2	CAs SHALL support an OCSP capability using the GET method.
2013-01-01	Cross-referenced	CAs SHALL comply with the Network and Certificate System Security Requirements.
2013-08-01	13.2.6	OCSP Responders SHALL NOT respond "Good" for Unissued Certificates.
2013-09-01	11.1.3	CAs SHALL revoke any certificate where wildcard character occurs in the first label position immediately to the left of a "registry-controlled" label or "public suffix".
2013-12-31	Appendix A, (2) and (3)	CAs SHALL confirm that the RSA Public Key is at least 2048 bits or that one of the following ECC curves is used: P-256, P-384, or P-521. A Root CA Certificate issued prior to 31 Dec. 2010 with an RSA key size less than 2048 bits MAY still serve as a trust anchor.
2015-01-16	9.4.2	CAs SHOULD NOT issue Subscriber Certificates utilizing the SHA-1 algorithm with an Expiry Date greater than 1 January 2017.
2015-04-01	9.4.1	CAs SHALL NOT issue certificates with validity periods longer than 39 months.
2015-04-15	8.2.2	A CA's CPS must state whether it reviews CAA Records, and if so, its policy or practice on processing CAA records for Fully Qualified Domain Names.
2015-11-01	9.2.1	Issuance of Certificates with Reserved IP Address or Internal Name prohibited.
2016-01-01	9.4.2	CAs MUST NOT issue any new Subscriber certificates or Subordinate CA certificates using the SHA-1 hash algorithm.
2016-10-01	9.2.1	All Certificates with Reserved IP Address or Internal Name must be revoked.
2017-01-01	9.4.2	CAs MUST NOT issue OCSP responder certificates using SHA-1 (inferred).

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1. Scope

The Baseline Requirements for the Issuance and Management of Publicly-Trusted Certificates describe a subset of the requirements that a Certification Authority must meet in order to issue Publicly Trusted Certificates. Except where explicitly stated otherwise, these requirements apply only to relevant events that occur on or after the Effective Date.

These Requirements do not address all of the issues relevant to the issuance and management of Publicly-Trusted Certificates. The CA/Browser Forum may update the Requirements from time to time, in order to address both existing and emerging threats to online security. In particular, it is expected that a future version will contain more formal and comprehensive audit requirements for delegated functions.

This version of the Requirements only addresses Certificates intended to be used for authenticating servers accessible through the Internet. Similar requirements for code signing, S/MIME, time-stamping, VoIP, IM, Web services, etc. may be covered in future versions.

These Requirements do not address the issuance, or management of Certificates by enterprises that operate their own Public Key Infrastructure for internal purposes only, and for which the Root Certificate is not distributed by any Application Software Supplier.

These Requirements are applicable to all Certification Authorities within a chain of trust. They are to be flowed down from the Root Certification Authority through successive Subordinate Certification Authorities.

2. Purpose

The primary goal of these Requirements is to enable efficient and secure electronic communication, while addressing user concerns about the trustworthiness of Certificates. The Requirements also serve to inform users and help them to make informed decisions when relying on Certificates.

3. References

ETSI TS 119 403, Electronic Signatures and Infrastructures (ESI); Trust Service Provider Conformity Assessment - General Requirements and Guidance.

ETSI TS 102 042, Electronic Signatures and Infrastructures (ESI); Policy requirements for certification authorities issuing public key certificates.

FIPS 140-2, Federal Information Processing Standards Publication - Security Requirements For Cryptographic Modules, Information Technology Laboratory, National Institute of Standards and Technology, May 25, 2001.

ISO 21188:2006, Public key infrastructure for financial services -- Practices and policy framework.

NIST SP 800-89, Recommendation for Obtaining Assurances for Digital Signature Applications, http://csrc.nist.gov/publications/nistpubs/800-89/SP-800-89_November2006.pdf.

RFC2119, Request for Comments: 2119, Key words for use in RFCs to Indicate Requirement Levels, Bradner, March 1997.

RFC2527, Request for Comments: 2527, Internet X.509 Public Key Infrastructure: Certificate Policy and Certification Practices Framework, Chokhani, et al, March 1999.

RFC2560, Request for Comments: 2560, X.509 Internet Public Key Infrastructure Online Certificate Status Protocol - OCSP M. Myers, et al, June 1999.

RFC3647, Request for Comments: 3647, Internet X.509 Public Key Infrastructure: Certificate Policy and Certification Practices Framework, Chokhani, et al, November 2003.

RFC4366, Request for Comments: 4366, Transport Layer Security (TLS) Extensions, Blake-Wilson, et al, April 2006.

RFC5019, Request for Comments: 5019, The Lightweight Online Certificate Status Protocol (OCSP) Profile for High-Volume Environments, A. Deacon, et al, September 2007.

RFC5280, Request for Comments: 5280, Internet X.509 Public Key Infrastructure: Certificate and Certificate Revocation List (CRL) Profile, Cooper et al, May 2008.

WebTrust for Certification Authorities, SSL Baseline with Network Security, Version 2.0, available at http://www.webtrust.org/homepage-documents/item79806.pdf.

X.509v3, ITU-T Recommendation X.509 (2005) | ISO/IEC 9594-8:2005, Information technology - Open Systems Interconnection - The Directory: Public-key and attribute certificate frameworks.

4. Definitions

Affiliate: A corporation, partnership, joint venture or other entity controlling, controlled by, or under common control with another entity, or an agency, department, political subdivision, or any entity operating under the direct control of a Government Entity.

Applicant: The natural person or Legal Entity that applies for (or seeks renewal of) a Certificate. Once the Certificate issues, the Applicant is referred to as the Subscriber. For Certificates issued to devices, the Applicant is the entity that controls or operates the device named in the Certificate, even if the device is sending the actual certificate request.

Applicant Representative: A natural person or human sponsor who is either the Applicant, employed by the Applicant, or an authorized agent who has express authority to represent the Applicant: (i) who signs and submits, or approves a certificate request on behalf of the Applicant, and/or (ii) who signs and submits a Subscriber Agreement on behalf of the Applicant, and/or (iii) who acknowledges and agrees to the Certificate Terms of Use on behalf of the Applicant when the Applicant is an Affiliate of the CA.

Application Software Supplier: A supplier of Internet browser software or other relying-party application software that displays or uses Certificates and incorporates Root Certificates.

Attestation Letter: A letter attesting that Subject Information is correct written by an accountant, lawyer, government official, or other reliable third party customarily relied upon for such information.

Audit Report: A report from a Qualified Auditor stating the Qualified Auditor's opinion on whether an entity's processes and controls comply with the mandatory provisions of these Requirements.

CAA Record: From RFC 6844 (http:tools.ietf.org/html/rfc6844): "The Certification Authority Authorization (CAA) DNS Resource Record allows a DNS domain name holder to specify the Certification Authorities (CAs) authorized to issue certificates for that domain. Publication of CAA Resource Records allows a public Certification Authority to implement additional controls to reduce the risk of unintended certificate mis-issue."

Certificate: An electronic document that uses a digital signature to bind a public key and an identity.

Certificate Data: Certificate requests and data related thereto (whether obtained from the Applicant or otherwise) in the CA's possession or control or to which the CA has access.

Certificate Management Process: Processes, practices, and procedures associated with the use of keys, software, and hardware, by which the CA verifies Certificate Data, issues Certificates, maintains a Repository, and revokes Certificates.

Certificate Policy: A set of rules that indicates the applicability of a named Certificate to a particular community and/or PKI implementation with common security requirements.

Certificate Problem Report: Complaint of suspected Key Compromise, Certificate misuse, or other types of fraud, compromise, misuse, or inappropriate conduct related to Certificates.

Certificate Revocation List: A regularly updated time-stamped list of revoked Certificates that is created and digitally signed by the CA that issued the Certificates.

Certification Authority: An organization that is responsible for the creation, issuance, revocation, and management of Certificates. The term applies equally to both Roots CAs and Subordinate CAs.

Certification Practice Statement: One of several documents forming the governance framework in which Certificates are created, issued, managed, and used.

Control: "Control" (and its correlative meanings, "controlled by" and "under common control with") means possession, directly or indirectly, of the power to: (1) direct the management, personnel, finances, or plans of such entity; (2) control the election of a majority of the directors; or (3) vote that portion of voting shares required for "control" under the law of the entity's Jurisdiction of Incorporation or Registration but in no case less than 10%.

Country: Either a member of the United Nations OR a geographic region recognized as a sovereign nation by at least two UN member nations.

Cross Certificate: A certificate that is used to establish a trust relationship between two Root CAs.

Delegated Third Party: A natural person or Legal Entity that is not the CA but is authorized by the CA to assist in the Certificate Management Process by performing or fulfilling one or more of the CA requirements found herein.

Domain Authorization Document: Documentation provided by, or a CA's documentation of a communication with, a Domain Name Registrar, the Domain Name Registrant, or the person or entity listed in WHOIS as the Domain Name Registrant (including any private, anonymous, or proxy registration service) attesting to the authority of an Applicant to request a Certificate for a specific Domain Namespace.

Domain Name: The label assigned to a node in the Domain Name System.

Domain Namespace: The set of all possible Domain Names that are subordinate to a single node in the Domain Name System.

Domain Name Registrant: Sometimes referred to as the "owner" of a Domain Name, but more properly the person(s) or entity(ies) registered with a Domain Name Registrar as having the right to control how a Domain Name is used, such as the natural person or Legal Entity that is listed as the "Registrant" by WHOIS or the Domain Name Registrar.

Domain Name Registrar: A person or entity that registers Domain Names under the auspices of or by agreement with: (i) the Internet Corporation for Assigned Names and Numbers (ICANN), (ii) a national Domain Name authority/registry, or (iii) a Network Information Center (including their affiliates, contractors, delegates, successors, or assigns).

Effective Date: These Requirements come into force on 1 July 2012.

Enterprise RA: An employee or agent of an organization unaffiliated with the CA who authorizes issuance of Certificates to that organization.

Expiry Date: The "Not After" date in a Certificate that defines the end of a Certificate's validity period.

Fully-Qualified Domain Name: A Domain Name that includes the labels of all superior nodes in the Internet Domain Name System.

Government Entity: A government-operated legal entity, agency, department, ministry, branch, or similar element of the government of a country, or political subdivision within such country (such as a state, province, city, county, etc.).

High Risk Certificate Request: A Request that the CA flags for additional scrutiny by reference to internal criteria and databases maintained by the CA, which may include names at higher risk for phishing or other fraudulent usage, names contained in previously rejected certificate requests or revoked Certificates, names listed on the Miller Smiles phishing list or the Google Safe Browsing list, or names that the CA identifies using its own risk-mitigation criteria.

Internal Name: A string of characters (not an IP address) in a Common Name or Subject Alternative Name field of a Certificate that cannot be verified as globally unique within the public DNS at the time of certificate issuance because it does not end with a Top Level Domain registered in IANA's Root Zone Database.

Issuing CA: In relation to a particular Certificate, the CA that issued the Certificate. This could be either a Root CA or a Subordinate CA.

Key Compromise: A Private Key is said to be compromised if its value has been disclosed to an unauthorized person, an unauthorized person has had access to it, or there exists a practical technique by which an unauthorized person may discover its value. A Private Key is also considered compromised if methods have been developed that can easily calculate it based on the Public Key (such as a Debian weak key, see http://wiki.debian.org/SSLkeys) or if there is clear evidence that the specific method used to generate the Private Key was flawed.

Key Generation Script: A documented plan of procedures for the generation of a CA Key Pair**.**

Key Pair: The Private Key and its associated Public Key.

Legal Entity: An association, corporation, partnership, proprietorship, trust, government entity or other entity with legal standing in a country's legal system.

Object Identifier: A unique alphanumeric or numeric identifier registered under the International Organization for Standardization's applicable standard for a specific object or object class.

OCSP Responder: An online server operated under the authority of the CA and connected to its Repository for processing Certificate status requests. See also, Online Certificate Status Protocol.

Online Certificate Status Protocol: An online Certificate-checking protocol that enables relying-party application software to determine the status of an identified Certificate. See also OCSP Responder.

Parent Company: A company that Controls a Subsidiary Company.

Private Key: The key of a Key Pair that is kept secret by the holder of the Key Pair, and that is used to create Digital Signatures and/or to decrypt electronic records or files that were encrypted with the corresponding Public Key.

Public Key: The key of a Key Pair that may be publicly disclosed by the holder of the corresponding Private Key and that is used by a Relying Party to verify Digital Signatures created with the holder's corresponding Private Key and/or to encrypt messages so that they can be decrypted only with the holder's corresponding Private Key.

Public Key Infrastructure: A set of hardware, software, people, procedures, rules, policies, and obligations used to facilitate the trustworthy creation, issuance, management, and use of Certificates and keys based on Public Key Cryptography.

Publicly-Trusted Certificate: A Certificate that is trusted by virtue of the fact that its corresponding Root Certificate is distributed as a trust anchor in widely-available application software.

Qualified Auditor: A natural person or Legal Entity that meets the requirements of Section 17.6 (Auditor Qualifications).

Registered Domain Name: A Domain Name that has been registered with a Domain Name Registrar.

Registration Authority (RA): Any Legal Entity that is responsible for identification and authentication of subjects of Certificates, but is not a CA, and hence does not sign or issue Certificates. An RA may assist in the certificate application process or revocation process or both. When "RA" is used as an adjective to describe a role or function, it does not necessarily imply a separate body, but can be part of the CA.

Reliable Data Source: An identification document or source of data used to verify Subject Identity Information that is generally recognized among commercial enterprises and governments as reliable, and which was created by a third party for a purpose other than the Applicant obtaining a Certificate.

Reliable Method of Communication: A method of communication, such as a postal/courier delivery address, telephone number, or email address, that was verified using a source other than the Applicant Representative.

Relying Party: Any natural person or Legal Entity that relies on a Valid Certificate. An Application Software Supplier is not considered a Relying Party when software distributed by such Supplier merely displays information relating to a Certificate.

Repository: An online database containing publicly-disclosed PKI governance documents (such as Certificate Policies and Certification Practice Statements) and Certificate status information, either in the form of a CRL or an OCSP response.

Requirements: This document.

Reserved IP Address: An IPv4 or IPv6 address that the IANA has marked as reserved:
http://www.iana.org/assignments/ipv4-address-space/ipv4-address-space.xml
http://www.iana.org/assignments/ipv6-address-space/ipv6-address-space.xml

Root CA: The top level Certification Authority whose Root Certificate is distributed by Application Software Suppliers and that issues Subordinate CA Certificates.

Root Certificate: The self-signed Certificate issued by the Root CA to identify itself and to facilitate verification of Certificates issued to its Subordinate CAs.

Sovereign State: A state or country that administers its own government, and is not dependent upon, or subject to, another power.

Subject: The natural person, device, system, unit, or Legal Entity identified in a Certificate as the Subject. The Subject is either the Subscriber or a device under the control and operation of the Subscriber.

Subject Identity Information: Information that identifies the Certificate Subject. Subject Identity Information does not include a domain name listed in the subjectAltName extension or the Subject commonName field.

Subordinate CA: A Certification Authority whose Certificate is signed by the Root CA, or another Subordinate CA.

Subscriber: A natural person or Legal Entity to whom a Certificate is issued and who is legally bound by a Subscriber or Terms of Use Agreement.

Subscriber Agreement: An agreement between the CA and the Applicant/Subscriber that specifies the rights and responsibilities of the parties.

Subsidiary Company: A company that is controlled by a Parent Company.

Technically Constrained Subordinate CA Certificate: A Subordinate CA certificate which uses a combination of Extended Key Usage settings and Name Constraint settings to limit the scope within which the Subordinate CA Certificate may issue Subscriber or additional Subordinate CA Certificates.

Terms of Use: Provisions regarding the safekeeping and acceptable uses of a Certificate issued in accordance with these Requirements when the Applicant/Subscriber is an Affiliate of the CA.

Trustworthy System: Computer hardware, software, and procedures that are: reasonably secure from intrusion and misuse; provide a reasonable level of availability, reliability, and correct operation; are reasonably suited to performing their intended functions; and enforce the applicable security policy.

Unregistered Domain Name: A Domain Name that is not a Registered Domain Name.

Valid Certificate: A Certificate that passes the validation procedure specified in RFC 5280.

Validation Specialists: Someone who performs the information verification duties specified by these Requirements.

Validity Period: The period of time measured from the date when the Certificate is issued until the Expiry Date.

Wildcard Certificate: A Certificate containing an asterisk (*) in the left-most position of any of the Subject Fully-Qualified Domain Names contained in the Certificate.

5. Abbreviations and Acronyms

AICPA	American Institute of Certified Public Accountants
CA	Certification Authority
CAA	Certification Authority Authorization
ccTLD	Country Code Top-Level Domain
CICA	Canadian Institute of Chartered Accountants
CP	Certificate Policy
CPS	Certification Practice Statement
CRL	Certificate Revocation List
DBA	Doing Business As
DNS	Domain Name System
FIPS	(US Government) Federal Information Processing Standard
FQDN	Fully Qualified Domain Name
IM	Instant Messaging
IANA	Internet Assigned Numbers Authority
ICANN	Internet Corporation for Assigned Names and Numbers
ISO	International Organization for Standardization
NIST	(US Government) National Institute of Standards and Technology
OCSP	Online Certificate Status Protocol
OID	Object Identifier
PKI	Public Key Infrastructure
RA	Registration Authority
S/MIME	Secure MIME (Multipurpose Internet Mail Extensions)
SSL	Secure Sockets Layer
TLD	Top-Level Domain
TLS	Transport Layer Security
VOIP	Voice Over Internet Protocol

6. Conventions

Terms not otherwise defined in these Requirements shall be as defined in applicable agreements, user manuals, Certificate Policies and Certification Practice Statements, of the CA.

The key words “MUST”, “MUST NOT”, "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in these Requirements shall be interpreted in accordance with RFC 2119.

7. Certificate Warranties and Representations

7.1 By the CA

By issuing a Certificate, the CA makes the Certificate Warranties listed in Section 7.1.2 to the Certificate Beneficiaries listed in 7.1.1.

7.1.1 Certificate Beneficiaries

Certificate Beneficiaries include, but are not limited to, the following:

1. The Subscriber that is a party to the Subscriber or Terms of Use Agreement for the Certificate;
2. All Application Software Suppliers with whom the Root CA has entered into a contract for inclusion of its Root Certificate in software distributed by such Application Software Supplier; and
3. All Relying Parties who reasonably rely on a Valid Certificate.

7.1.2 Certificate Warranties

The CA represents and warrants to the Certificate Beneficiaries that, during the period when the Certificate is valid, the CA has complied with these Requirements and its Certificate Policy and/or Certification Practice Statement in issuing and managing the Certificate.

The Certificate Warranties specifically include, but are not limited to, the following:

1. **Right to Use Domain Name or IP Address:** That, at the time of issuance, the CA (i) implemented a procedure for verifying that the Applicant either had the right to use, or had control of, the Domain Name(s) and IP address(es) listed in the Certificate's subject field and subjectAltName extension (or, only in the case of Domain Names, was delegated such right or control by someone who had such right to use or control); (ii) followed the procedure when issuing the Certificate; and (iii) accurately described the procedure in the CA's Certificate Policy and/or Certification Practice Statement;
2. **Authorization for Certificate:** That, at the time of issuance, the CA (i) implemented a procedure for verifying that the Subject authorized the issuance of the Certificate and that the Applicant Representative is authorized to request the Certificate on behalf of the Subject; (ii) followed the procedure when issuing the Certificate; and (iii) accurately described the procedure in the CA's Certificate Policy and/or Certification Practice Statement;
3. **Accuracy of Information:** That, at the time of issuance, the CA (i) implemented a procedure for verifying the accuracy of all of the information contained in the Certificate (with the exception of the subject:organizationalUnitName attribute); (ii) followed the procedure when issuing the Certificate; and (iii) accurately described the procedure in the CA's Certificate Policy and/or Certification Practice Statement;
4. **No Misleading Information:** That, at the time of issuance, the CA (i) implemented a procedure for reducing the likelihood that the information contained in the Certificate's subject:organizationalUnitName attribute would be misleading; (ii) followed the procedure when issuing the Certificate; and (iii) accurately described the procedure in the CA's Certificate Policy and/or Certification Practice Statement;
5. **Identity of Applicant:** That, if the Certificate contains Subject Identity Information, the CA (i) implemented a procedure to verify the identity of the Applicant in accordance with Sections 9.2.4 and 11.2; (ii) followed the procedure when issuing the Certificate; and (iii) accurately described the procedure in the CA's Certificate Policy and/or Certification Practice Statement;
6. **Subscriber Agreement:** That, if the CA and Subscriber are not Affiliated, the Subscriber and CA are parties to a legally valid and enforceable Subscriber Agreement that satisfies these Requirements, or, if the CA and Subscriber are Affiliated, the Applicant Representative acknowledged and accepted the Terms of Use;

7. **Status:** That the CA maintains a 24 x 7 publicly-accessible Repository with current information regarding the status (valid or revoked) of all unexpired Certificates; and
8. **Revocation:** That the CA will revoke the Certificate for any of the reasons specified in these Requirements.

7.2 By the Applicant

The CA SHALL require, as part of the Subscriber or Terms of Use Agreement, that the Applicant make the commitments and warranties set forth in Section 10.3.2 of these Requirements, for the benefit of the CA and the Certificate Beneficiaries.

8. Community and Applicability

8.1 Compliance

The CA SHALL at all times:

1. Issue Certificates and operate its PKI in accordance with all law applicable to its business and the Certificates it issues in every jurisdiction in which it operates;
2. Comply with these Requirements;
3. Comply with the audit requirements set forth in Section 17; and
4. Be licensed as a CA in each jurisdiction where it operates, if licensing is required by the law of such jurisdiction for the issuance of Certificates.

If a court or government body with jurisdiction over the activities covered by these Requirements determines that the performance of any mandatory requirement is illegal, then such requirement is considered reformed to the minimum extent necessary to make the requirement valid and legal. This applies only to operations or certificate issuances that are subject to the laws of that jurisdiction. The parties involved SHALL notify the CA / Browser Forum of the facts, circumstances, and law(s) involved, so that the CA/Browser Forum may revise these Requirements accordingly.

8.2 Certificate Policies

8.2.1 Implementation

The CA SHALL develop, implement, enforce, and annually update a Certificate Policy and/or Certification Practice Statement that describes in detail how the CA implements the latest version of these Requirements.

8.2.2 Disclosure

The CA SHALL publicly disclose its Certificate Policy and/or Certification Practice Statement through an appropriate and readily accessible online means that is available on a 24x7 basis. The CA SHALL publicly disclose its CA business practices to the extent required by the CA's selected audit scheme (see Section 17.1). The disclosures MUST include all the material required by RFC 2527 or RFC 3647, and MUST be structured in accordance with either RFC 2527 or RFC 3647. Effective as of 15 April 2015, section 4.2 of a CA's Certificate Policy and/or Certification Practice Statement (section 4.1 for CAs still conforming to RFC 2527) SHALL state whether the CA reviews CAA Records, and if so, the CA's policy or practice on processing CAA Records for Fully Qualified Domain Names. The CA SHALL log all actions taken, if any, consistent with its processing practice.

8.3 Commitment to Comply

The CA SHALL publicly give effect to these Requirements and represent that it will adhere to the latest published version. The CA MAY fulfill this requirement by incorporating these Requirements directly into its Certificate

Policy and/or Certification Practice Statements or by incorporating them by reference using a clause such as the following (which MUST include a link to the official version of these Requirements):

> [Name of CA] conforms to the current version of the Baseline Requirements for the Issuance and Management of Publicly-Trusted Certificates published at http://www.cabforum.org. In the event of any inconsistency between this document and those Requirements, those Requirements take precedence over this document.

8.4 Trust model

The CA SHALL disclose all Cross Certificates that identify the CA as the Subject, provided that the CA arranged for or accepted the establishment of the trust relationship (i.e. the Cross Certificate at issue).

9. Certificate Content and Profile

9.1 Issuer Information

An Issuing CA SHALL populate the issuer field of each Certificate issued after the adoption of these Requirements in accordance with the following subsections.

9.1.1 Issuer Common Name Field

Certificate Field: issuer:commonName (OID 2.5.4.3)

Required/Optional: Optional

Contents: If present in a Certificate, the Common Name field MUST include a name that accurately identifies the Issuing CA.

9.1.2 Issuer Domain Component Field

Certificate Field: issuer:domainComponent (OID 0.9.2342.19200300.100.1.25)

Required/Optional: Optional.

Contents: If present in a Certificate, the Domain Component field MUST include all components of the Issuing CA's Registered Domain Name in ordered sequence, with the most significant component, closest to the root of the namespace, written last.

9.1.3 Issuer Organization Name Field

Certificate Field: issuer:organizationName (OID 2.5.4.10)

Required/Optional: Required

Contents: This field MUST contain the name (or abbreviation thereof), trademark, or other meaningful identifier for the CA, provided that they accurately identify the CA. The field MUST NOT contain a generic designation such as "Root" or "CA1".

9.1.4 Issuer Country Name Field

Certificate Field: issuer:countryName (OID 2.5.4.6)

Required/Optional: Required

Contents: This field MUST contain the two-letter ISO 3166-1 country code for the country in which the issuer's place of business is located.

9.2 Subject Information

By issuing the Certificate, the CA represents that it followed the procedure set forth in its Certificate Policy and/or Certification Practice Statement to verify that, as of the Certificate's issuance date, all of the Subject Information was accurate. CAs SHALL NOT include a Domain Name in a Subject attribute except as specified in Sections 9.2.1 and 9.2.2 below

9.2.1 Subject Alternative Name Extension

Certificate Field: extensions:subjectAltName

Required/Optional: Required

Contents: This extension MUST contain at least one entry. Each entry MUST be either a dNSName containing the Fully-Qualified Domain Name or an iPAddress containing the IP address of a server. The CA MUST confirm that the Applicant controls the Fully-Qualified Domain Name or IP address or has been granted the right to use it by the Domain Name Registrant or IP address assignee, as appropriate.

Wildcard FQDNs are permitted.

As of the Effective Date of these Requirements, prior to the issuance of a Certificate with a subjectAlternativeName extension or Subject commonName field containing a Reserved IP Address or Internal Name, the CA SHALL notify the Applicant that the use of such Certificates has been deprecated by the CA / Browser Forum and that the practice will be eliminated by October 2016. Also as of the Effective Date, the CA SHALL NOT issue a certificate with an Expiry Date later than 1 November 2015 with a subjectAlternativeName extension or Subject commonName field containing a Reserved IP Address or Internal Name. Effective 1 October 2016, CAs SHALL revoke all unexpired Certificates whose subjectAlternativeName extension or Subject commonName field contains a Reserved IP Address or Internal Name.

9.2.2 Subject Common Name Field

Certificate Field: subject:commonName (OID 2.5.4.3)

Required/Optional: Deprecated (Discouraged, but not prohibited)

Contents: If present, this field MUST contain a single IP address or Fully-Qualified Domain Name that is one of the values contained in the Certificate's subjectAltName extension (see Section 9.2.1).

9.2.3 Subject Domain Component Field

Certificate Field: subject:domainComponent (OID 0.9.2342.19200300.100.1.25)

Required/Optional: Optional.

Contents: If present, this field MUST contain a label from a Domain Name.

The domainComponent fields for each Domain Name MUST be in a single ordered sequence containing all labels from the Domain name. The labels MUST be encoded in the reverse order to the on-wire representation of domain names in the DNS protocol, so that the label closest to the root is encoded first.

The CA MUST ensure that the certificate is issued with the consent of, and according to procedures established by, the owner of each Domain Name.

9.2.4 Subject Distinguished Name Fields

a. Certificate Field: subject:organizationName (OID 2.5.4.10)

Optional.

Contents: If present, the subject:organizationName field MUST contain either the Subject's name or DBA as verified under Section 11.2. The CA may include information in this field that differs slightly from the verified name, such as common variations or abbreviations, provided that the CA documents the difference and any abbreviations used are locally accepted abbreviations; e.g., if the official record shows "Company Name Incorporated", the CA MAY use "Company Name Inc." or "Company Name". Because Subject name attributes for individuals (e.g. givenName (2.5.4.42) and surname (2.5.4.4)) are not broadly supported by application software, the CA MAY use the subject:organizationName field to convey a natural person Subject's name or DBA.

b. Certificate Field: Number and street: subject:streetAddress (OID: 2.5.4.9)

Optional if the subject:organizationName field is present.

Prohibited if the subject:organizationName field is absent.

Contents: If present, the subject:streetAddress field MUST contain the Subject's street address information as verified under Section 11.2.

c. Certificate Field: subject:localityName (OID: 2.5.4.7)

Required if the subject:organizationName field is present and the subject:stateOrProvinceName field is absent.

Optional if the subject:organizationName and subject:stateOrProvinceName fields are present.

Prohibited if the subject:organizationName field is absent.

Contents: If present, the subject:localityName field MUST contain the Subject's locality information as verified under Section 11.2. If the subject:countryName field specifies the ISO 3166-1 user-assigned code of XX in accordance with subsection 9.2.4.f, the localityName field MAY contain the Subject's locality and/or state or province information as verified under Section 11.2.

d. Certificate Field: subject:stateOrProvinceName (OID: 2.5.4.8)

Required if the subject:organizationName field is present and subject:localityName field is absent.

Optional if subject:organizationName and subject:localityName fields are present.

Prohibited if the subject:organizationName field is absent.

Contents: If present, the subject:stateOrProvinceName field MUST contain the Subject's state or province information as verified under Section 11.2. If the subject:countryName field specifies the ISO 3166-1 user-assigned code of XX in accordance with subsection 9.2.4.f, the subject:stateOrProvinceName field MAY contain the full name of the Subject's country information as verified under Section 11.2.5.

e. Certificate Field: subject:postalCode (OID: 2.5.4.17)

Optional if the subject:organizationName field is present.

Prohibited if the subject:organizationName field is absent.

Contents: If present, the subject:postalCode field MUST contain the Subject's zip or postal information as verified under Section 11.2

f. Certificate Field: subject:countryName (OID: 2.5.4.6)

Required if the subject:organizationName field is present.

Optional if the subject:organizationName field is absent.

Contents: If the subject:organizationName field is present, the subject:countryName MUST contain the two-letter ISO 3166-1 country code associated with the location of the Subject verified under Section 11.2. If the subject:organizationName field is absent, the subject:countryName field MAY contain the two-letter ISO 3166-1 country code associated with the Subject as verified in accordance with Section 11.2.5. If a Country is not represented by an official ISO 3166-1 country code, the CA MAY specify the ISO 3166-1 user-assigned code of XX indicating that an official ISO 3166-1 alpha-2 code has not been assigned.

g. Certificate Field: subject:organizationalUnitName

Optional.

The CA SHALL implement a process that prevents an OU attribute from including a name, DBA, tradename, trademark, address, location, or other text that refers to a specific natural person or Legal Entity unless the CA has verified this information in accordance with Section 11.2 and the Certificate also contains subject:organizationName, subject:localityName, and subject:countryName attributes, also verified in accordance with Section 11.2.

h. Other Subject Attributes

All other optional attributes, when present within the subject field, MUST contain information that has been verified by the CA. Optional attributes MUST NOT contain metadata such as '.', '-', and ' ' (i.e. space) characters, and/or any other indication that the value is absent, incomplete, or not applicable.

9.2.5 Subject Information – Subordinate CA Certificates

By issuing a Subordinate CA Certificate, the CA represents that it followed the procedure set forth in its Certificate Policy and/or Certification Practice Statement to verify that, as of the Certificate's issuance date, all of the Subject Information was accurate.

9.3 Certificate Policy Identification

This section describes the content requirements for the Root CA, Subordinate CA, and Subscriber Certificates, as they relate to the identification of Certificate Policy.

9.3.1 Reserved Certificate Policy Identifiers

The following Certificate Policy identifiers are reserved for use by CAs as an optional means of asserting compliance with these Requirements as follows:

> {joint-iso-itu-t(2) international-organizations(23) ca-browser-forum(140) certificate-policies(1) baseline-requirements(2) domain-validated(1)} (2.23.140.1.2.1), if the Certificate complies with these Requirements but lacks Subject Identity Information that is verified in accordance with Section 11.2.

If the Certificate asserts the policy identifier of 2.23.140.1.2.1, then it MUST NOT include organizationName, streetAddress, localityName, stateOrProvinceName, or postalCode in the Subject field.

> {joint-iso-itu-t(2) international-organizations(23) ca-browser-forum(140) certificate-policies(1) baseline-requirements(2) subject-identity-validated(2)} (2.23.140.1.2.2), if the Certificate complies with these Requirements and includes Subject Identity Information that is verified in accordance with Section 11.2.

If the Certificate asserts the policy identifier of 2.23.140.1.2.2, then it MUST also include organizationName, localityName, stateOrProvinceName (if applicable), and countryName in the Subject field.

9.3.2 Root CA Certificates

A Root CA Certificate SHOULD NOT contain the certificatePolicies extension.

9.3.3 Subordinate CA Certificates

A Certificate issued after the Effective Date to a Subordinate CA that is not an Affiliate of the Issuing CA:

1. MUST include one or more explicit policy identifiers that indicates the Subordinate CA's adherence to and compliance with these Requirements (i.e. either the CA/Browser Forum reserved identifiers or identifiers defined by the CA in its Certificate Policy and/or Certification Practice Statement) and
2. MUST NOT contain the "anyPolicy" identifier (2.5.29.32.0).

A Certificate issued after the Effective Date to a Subordinate CA that is an affiliate of the Issuing CA:

1. MAY include the CA/Browser Forum reserved identifiers or an identifier defined by the CA in its Certificate Policy and/or Certification Practice Statement to indicate the Subordinate CA's compliance with these Requirements and
2. MAY contain the "anyPolicy" identifier (2.5.29.32.0) in place of an explicit policy identifier.

A Subordinate CA SHALL represent, in its Certificate Policy and/or Certification Practice Statement, that all Certificates containing a policy identifier indicating compliance with these Requirements are issued and managed in accordance with these Requirements.

9.3.4 Subscriber Certificates

A Certificate issued to a Subscriber MUST contain one or more policy identifier(s), defined by the Issuing CA, in the Certificate's certificatePolicies extension that indicates adherence to and compliance with these Requirements. CAs complying with these Requirements MAY also assert one of the reserved policy OIDs in such Certificates.

The issuing CA SHALL document in its Certificate Policy or Certification Practice Statement that the Certificates it issues containing the specified policy identifier(s) are managed in accordance with these Requirements.

9.4 Validity Period

9.4.1 Subscriber Certificates

Subscriber Certificates issued after the Effective Date MUST have a Validity Period no greater than 60 months.

Except as provided for below, Subscriber Certificates issued after 1 April 2015 MUST have a Validity Period no greater than 39 months.

Beyond 1 April 2015, CAs MAY continue to issue Subscriber Certificates with a Validity Period greater than 39 months but not greater than 60 months provided that the CA documents that the Certificate is for a system or software that:

(a) was in use prior to the Effective Date;

(b) is currently in use by either the Applicant or a substantial number of Relying Parties;

(c) fails to operate if the Validity Period is shorter than 60 months;

(d) does not contain known security risks to Relying Parties; and

(e) is difficult to patch or replace without substantial economic outlay.

9.4.2 SHA-1 Validity Period

Effective 1 January 2016, CAs MUST NOT issue any new Subscriber certificates or Subordinate CA certificates using the SHA-1 hash algorithm. CAs MAY continue to sign certificates to verify OCSP responses using SHA1 until 1 January 2017. This Section 9.4.2 does not apply to Root CA or CA cross certificates. CAs MAY continue to use their existing SHA-1 Root Certificates. SHA-2 Subscriber certificates SHOULD NOT chain up to a SHA-1 Subordinate CA Certificate.

Effective 16 January 2015, CAs SHOULD NOT issue Subscriber Certificates utilizing the SHA-1 algorithm with an Expiry Date greater than 1 January 2017 because Application Software Providers are in the process of deprecating and/or removing the SHA-1 algorithm from their software, and they have communicated that CAs and Subscribers using such certificates do so at their own risk.

9.5 Public Key

The CA SHALL reject a certificate request if the requested Public Key does not meet the requirements set forth in Appendix A or if it has a known weak Private Key (such as a Debian weak key, see http://wiki.debian.org/SSLkeys).

9.6 Certificate Serial Number

CAs SHOULD generate non-sequential Certificate serial numbers that exhibit at least 20 bits of entropy.

9.7 Technical Constraints in Subordinate CA Certificates via Name Constraints and EKU

For a Subordinate CA Certificate to be considered Technically Constrained, the certificate MUST include an Extended Key Usage (EKU) extension specifying all extended key usages that the Subordinate CA Certificate is authorized to issue certificates for. The anyExtendedKeyUsage KeyPurposeId MUST NOT appear within this extension.

If the Subordinate CA Certificate includes the id-kp-serverAuth extended key usage, then the Subordinate CA Certificate MUST include the Name Constraints X.509v3 extension with constraints on dNSName, iPAddress and DirectoryName as follows:-

> (a) For each dNSName in permittedSubtrees, the CA MUST confirm that the Applicant has registered the dNSName or has been authorized by the domain registrant to act on the registrant's behalf in line with the verification practices of section 11.1.
>
> (b) For each iPAddress range in permittedSubtrees, the CA MUST confirm that the Applicant has been assigned the iPAddress range or has been authorized by the assigner to act on the assignee's behalf.
>
> (c) For each DirectoryName in permittedSubtrees the CA MUST confirm the Applicants and/or Subsidiary's Organizational name and location such that end entity certificates issued from the subordinate CA Certificate will be in compliancy with section 9.2.4.

If the Subordinate CA Certificate is not allowed to issue certificates with an iPAddress, then the Subordinate CA Certificate MUST specify the entire IPv4 and IPv6 address ranges in excludedSubtrees. The Subordinate CA Certificate MUST include within excludedSubtrees an iPAddress GeneralName of 8 zero octets (covering the IPv4 address range of 0.0.0.0/0). The Subordinate CA Certificate MUST also include within excludedSubtrees an iPAddress GeneralName of 32 zero octets (covering the IPv6 address range of ::0/0). Otherwise, the Subordinate CA Certificate MUST include at least one iPAddress in permittedSubtrees.

A decoded example for issuance to the domain and sub domains of example.com by organization :- Example LLC, Boston, Massachusetts, US would be:-

```
X509v3 Name Constraints:
      Permitted:
            DNS:example.com
            DirName: C=US, ST=MA, L=Boston, O=Example LLC
      Excluded:
            IP:0.0.0.0/0.0.0.0
            IP:0:0:0:0:0:0:0:0/0:0:0:0:0:0:0:0
```

If the Subordinate CA is not allowed to issue certificates with dNSNames, then the Subordinate CA Certificate MUST include a zero-length dNSName in excludedSubtrees. Otherwise, the Subordinate CA Certificate MUST include at least one dNSName in permittedSubtrees.

9.8 Additional Technical Requirements

The CA SHALL meet the technical requirements set forth in Appendix A - Cryptographic Algorithm and Key Requirements; Appendix B – Certificate Content and Extensions; Application of RFC 5280; and Appendix C – User Agent Verification.

10. Certificate Application

10.1 Documentation Requirements

Prior to the issuance of a Certificate, the CA SHALL obtain the following documentation from the Applicant:

1. A certificate request, which may be electronic; and
2. An executed Subscriber or Terms of Use Agreement, which may be electronic.

The CA SHOULD obtain any additional documentation the CA determines necessary to meet these Requirements.

10.2 Certificate Request

10.2.1 General

Prior to the issuance of a Certificate, the CA SHALL obtain from the Applicant a certificate request in a form prescribed by the CA and that complies with these Requirements. One certificate request MAY suffice for multiple Certificates to be issued to the same Applicant, subject to the aging and updating requirement in Section 11.3, provided that each Certificate is supported by a valid, current certificate request signed by the appropriate Applicant Representative on behalf of the Applicant. The certificate request MAY be made, submitted and/or signed electronically.

10.2.2 Request and Certification

The certificate request MUST contain a request from, or on behalf of, the Applicant for the issuance of a Certificate, and a certification by, or on behalf of, the Applicant that all of the information contained therein is correct.

10.2.3 Information Requirements

The certificate request MAY include all factual information about the Applicant to be included in the Certificate, and such additional information as is necessary for the CA to obtain from the Applicant in order to comply with

these Requirements and the CA's Certificate Policy and/or Certification Practice Statement. In cases where the certificate request does not contain all the necessary information about the Applicant, the CA SHALL obtain the remaining information from the Applicant or, having obtained it from a reliable, independent, third-party data source, confirm it with the Applicant. The CA SHALL establish and follow a documented procedure for verifying all data requested for inclusion in the Certificate by the Applicant.

Applicant information MUST include, but not be limited to, at least one Fully-Qualified Domain Name or IP address to be included in the Certificate's SubjectAltName extension.

10.2.4 Subscriber Private Key

Parties other than the Subscriber SHALL NOT archive the Subscriber Private Key.

If the CA or any of its designated RAs generated the Private Key on behalf of the Subscriber, then the CA SHALL encrypt the Private Key for transport to the Subscriber.

If the CA or any of its designated RAs become aware that a Subscriber's Private Key has been communicated to an unauthorized person or an organization not affiliated with the Subscriber, then the CA SHALL revoke all certificates that include the Public Key corresponding to the communicated Private Key.

10.2.5 Subordinate CA Private Key

Parties other than the Subordinate CA SHALL NOT archive the Subordinate CA Private Keys. If the Issuing CA generated the Private Key on behalf of the Subordinate CA, then the Issuing CA SHALL encrypt the Private Key for transport to the Subordinate CA. If the Issuing CA becomes aware that a Subordinate CA's Private Key has been communicated to an unauthorized person or an organization not affiliated with the Subordinate CA, then the Issuing CA SHALL revoke all certificates that include the Public Key corresponding to the communicated Private Key.

10.3 Subscriber and Terms of Use Agreement

10.3.1 General

Prior to the issuance of a Certificate, the CA SHALL obtain, for the express benefit of the CA and the Certificate Beneficiaries, either:

1. The Applicant's agreement to the Subscriber Agreement with the CA, or
2. The Applicant's agreement to the Terms of Use agreement.

The CA SHALL implement a process to ensure that each Subscriber or Terms of Use Agreement is legally enforceable against the Applicant. In either case, the Agreement MUST apply to the Certificate to be issued pursuant to the certificate request. The CA MAY use an electronic or "click-through" Agreement provided that the CA has determined that such agreements are legally enforceable. A separate Agreement MAY be used for each certificate request, or a single Agreement MAY be used to cover multiple future certificate requests and the resulting Certificates, so long as each Certificate that the CA issues to the Applicant is clearly covered by that Subscriber or Terms of Use Agreement.

10.3.2 Agreement Requirements

The Subscriber or Terms of Use Agreement MUST contain provisions imposing on the Applicant itself (or made by the Applicant on behalf of its principal or agent under a subcontractor or hosting service relationship) the following obligations and warranties:

1. **Accuracy of Information:** An obligation and warranty to provide accurate and complete information at all times to the CA, both in the certificate request and as otherwise requested by the CA in connection with the issuance of the Certificate(s) to be supplied by the CA;
2. **Protection of Private Key:** An obligation and warranty by the Applicant to take all reasonable measures to maintain sole control of, keep confidential, and properly protect at all times the Private Key that

corresponds to the Public Key to be included in the requested Certificate(s) (and any associated activation data or device, e.g. password or token);

3. **Acceptance of Certificate:** An obligation and warranty that the Subscriber will review and verify the Certificate contents for accuracy;
4. **Use of Certificate:** An obligation and warranty to install the Certificate only on servers that are accessible at the subjectAltName(s) listed in the Certificate, and to use the Certificate solely in compliance with all applicable laws and solely in accordance with the Subscriber or Terms of Use Agreement;
5. **Reporting and Revocation:** An obligation and warranty to promptly cease using a Certificate and its associated Private Key, and promptly request the CA to revoke the Certificate, in the event that: (a) any information in the Certificate is, or becomes, incorrect or inaccurate, or (b) there is any actual or suspected misuse or compromise of the Subscriber's Private Key associated with the Public Key included in the Certificate;
6. **Termination of Use of Certificate:** An obligation and warranty to promptly cease all use of the Private Key corresponding to the Public Key included in the Certificate upon revocation of that Certificate for reasons of Key Compromise.
7. **Responsiveness:** An obligation to respond to the CA's instructions concerning Key Compromise or Certificate misuse within a specified time period.
8. **Acknowledgment and Acceptance:** An acknowledgment and acceptance that the CA is entitled to revoke the certificate immediately if the Applicant were to violate the terms of the Subscriber or Terms of Use Agreement or if the CA discovers that the Certificate is being used to enable criminal activities such as phishing attacks, fraud, or the distribution of malware.

11. Verification Practices

11.1 Authorization

11.1.1 Authorization by Domain Name Registrant

For each Fully-Qualified Domain Name listed in a Certificate, the CA SHALL confirm that, as of the date the Certificate was issued, the Applicant (or the Applicant's Parent Company, Subsidiary Company, or Affiliate, collectively referred to as "Applicant" for the purposes of this section) either is the Domain Name Registrant or has control over the FQDN by:

1. Confirming the Applicant as the Domain Name Registrant directly with the Domain Name Registrar;
2. Communicating directly with the Domain Name Registrant using an address, email, or telephone number provided by the Domain Name Registrar;
3. Communicating directly with the Domain Name Registrant using the contact information listed in the WHOIS record's "registrant", "technical", or "administrative" field;
4. Communicating with the Domain's administrator using an email address created by pre-pending 'admin', 'administrator', 'webmaster', 'hostmaster', or 'postmaster' in the local part, followed by the at-sign ("@"), followed by the Domain Name, which may be formed by pruning zero or more components from the requested FQDN;
5. Relying upon a Domain Authorization Document;
6. Having the Applicant demonstrate practical control over the FQDN by making an agreed-upon change to information found on an online Web page identified by a uniform resource identifier containing the FQDN; or

7. Using any other method of confirmation, provided that the CA maintains documented evidence that the method of confirmation establishes that the Applicant is the Domain Name Registrant or has control over the FQDN to at least the same level of assurance as those methods previously described.

Note: For purposes of determining the appropriate domain name level or Domain Namespace, the registerable Domain Name is the second-level domain for generic top-level domains (gTLD) such as .com, .net, or .org, or, if the Fully Qualified Domain Name contains a 2 letter Country Code Top-Level Domain (ccTLD), then the domain level is whatever is allowed for registration according to the rules of that ccTLD.

If the CA relies upon a Domain Authorization Document to confirm the Applicant's control over a FQDN, then the Domain Authorization Document MUST substantiate that the communication came from either the Domain Name Registrant (including any private, anonymous, or proxy registration service) or the Domain Name Registrar listed in the WHOIS. The CA MUST verify that the Domain Authorization Document was either (i) dated on or after the certificate request date or (ii) used by the CA to verify a previously issued certificate and that the Domain Name's WHOIS record has not been modified since the previous certificate's issuance.

Note: FQDNs may be listed in Subscriber Certificates using dNSNames in the subjectAltName extension or in Subordinate CA Certificates via dNSNames in permittedSubtrees within the Name Constraints extension.

11.1.2 Authorization for an IP Address

For each IP Address listed in a Certificate, the CA SHALL confirm that, as of the date the Certificate was issued, the Applicant has control over the IP Address by:

1. Having the Applicant demonstrate practical control over the IP Address by making an agreed-upon change to information found on an online Web page identified by a uniform resource identifier containing the IP Address;
2. Obtaining documentation of IP address assignment from the Internet Assigned Numbers Authority (IANA) or a Regional Internet Registry (RIPE, APNIC, ARIN, AfriNIC, LACNIC);
3. Performing a reverse-IP address lookup and then verifying control over the resulting Domain Name under Section 11.1.1; or
4. Using any other method of confirmation, provided that the CA maintains documented evidence that the method of confirmation establishes that the Applicant has control over the IP Address to at least the same level of assurance as the methods previously described.

Note: IPAddresses may be listed in Subscriber Certificates using IPAddress in the subjectAltName extension or in Subordinate CA Certificates via IPAddress in permittedSubtrees within the Name Constraints extension.

11.1.3 Wildcard Domain Validation

Before issuing a certificate with a wildcard character (*) in a CN or subjectAltName of type DNS-ID, the CA MUST establish and follow a documented procedure† that determines if the wildcard character occurs in the first label position to the left of a "registry-controlled" label or "public suffix" (e.g. "*.com", "*.co.uk", see RFC 6454 Section 8.2 for further explanation).

If a wildcard would fall within the label immediately to the left of a registry-controlled† or public suffix, CAs MUST refuse issuance unless the applicant proves its rightful control of the entire Domain Namespace. (e.g. CAs MUST NOT issue "*.co.uk" or "*.local", but MAY issue "*.example.com" to Example Co.).

Prior to September 1, 2013, each CA MUST revoke any valid certificate that does not comply with this section of the Requirements.

†Determination of what is "registry-controlled" versus the registerable portion of a Country Code Top-Level Domain Namespace is not standardized at the time of writing and is not a property of the DNS itself. Current best practice is to consult a "public suffix list" such as http://publicsuffix.org/ (PSL), and to retrieve a fresh copy regularly. If using the PSL, a CA SHOULD consult the "ICANN DOMAINS" section only, not the "PRIVATE DOMAINS" section. The PSL is updated regularly to contain new gTLDs delegated by ICANN, which are listed in

the "ICANN DOMAINS" section. A CA is not prohibited from issuing a Wildcard Certificate to the Registrant of an entire gTLD, provided that control of the entire namespace is demonstrated in an appropriate way.

11.1.4 New gTLD Domains

CAs SHOULD NOT issue Certificates containing a new gTLD under consideration by ICANN. Prior to issuing a Certificate containing an Internal Name with a gTLD that ICANN has announced as under consideration to make operational, the CA MUST provide a warning to the applicant that the gTLD may soon become resolvable and that, at that time, the CA will revoke the Certificate unless the applicant promptly registers the domain name. When a gTLD is delegated by inclusion in the IANA Root Zone Database, the Internal Name becomes a Domain Name, and at such time, a Certificate with such gTLD, which may have complied with these Requirements at the time it was issued, will be in a violation of these Requirements, unless the CA has verified the Subscriber's rights in the Domain Name. The provisions below are intended to prevent such violation from happening.

Within 30 days after ICANN has approved a new gTLD for operation, as evidenced by publication of a contract with the gTLD operator on [www.ICANN.org] each CA MUST (1) compare the new gTLD against the CA's records of valid certificates and (2) cease issuing Certificates containing a Domain Name that includes the new gTLD until after the CA has first verified the Subscriber's control over or exclusive right to use the Domain Name in accordance with Section 11.1.

Within 120 days after the publication of a contract for a new gTLD is published on [www.icann.org], CAs MUST revoke each Certificate containing a Domain Name that includes the new gTLD unless the Subscriber is either the Domain Name Registrant or can demonstrate control over the Domain Name.

11.2 Verification of Subject Identity Information

If the Applicant requests a Certificate that will contain Subject Identity Information comprised only of the countryName field, then the CA SHALL verify the country associated with the Subject using a verification process meeting the requirements of Section 11.2.5 and that is described in the CA's Certificate Policy and/or Certification Practice Statement. If the Applicant requests a Certificate that will contain the countryName field and other Subject Identity Information, then the CA SHALL verify the identity of the Applicant, and the authenticity of the Applicant Representative's certificate request using a verification process meeting the requirements of this Section 0 and that is described in the CA's Certificate Policy and/or Certification Practice Statement. The CA SHALL inspect any document relied upon under this Section for alteration or falsification.

11.2.1 Identity

If the Subject Identity Information is to include the name or address of an organization, the CA SHALL verify the identity and address of the organization and that the address is the Applicant's address of existence or operation. The CA SHALL verify the identity and address of the Applicant using documentation provided by, or through communication with, at least one of the following:

1. A government agency in the jurisdiction of the Applicant's legal creation, existence, or recognition;
2. A third party database that is periodically updated and considered a Reliable Data Source;
3. A site visit by the CA or a third party who is acting as an agent for the CA; or
4. An Attestation Letter.

The CA MAY use the same documentation or communication described in 1 through 4 above to verify both the Applicant's identity and address.

Alternatively, the CA MAY verify the address of the Applicant (but not the identity of the Applicant) using a utility bill, bank statement, credit card statement, government-issued tax document, or other form of identification that the CA determines to be reliable.

11.2.2 DBA/Tradename

If the Subject Identity Information is to include a DBA or tradename, the CA SHALL verify the Applicant's right to use the DBA/tradename using at least one of the following:

1. Documentation provided by, or communication with, a government agency in the jurisdiction of the Applicant's legal creation, existence, or recognition;
2. A Reliable Data Source;
3. Communication with a government agency responsible for the management of such DBAs or tradenames;
4. An Attestation Letter accompanied by documentary support; or
5. A utility bill, bank statement, credit card statement, government-issued tax document, or other form of identification that the CA determines to be reliable.

11.2.3 Authenticity of Certificate Request

If the Applicant for a Certificate containing Subject Identity Information is an organization, the CA SHALL use a Reliable Method of Communication to verify the authenticity of the Applicant Representative's certificate request.

The CA MAY use the sources listed in section 11.2.1 to verify the Reliable Method of Communication. Provided that the CA uses a Reliable Method of Communication, the CA MAY establish the authenticity of the certificate request directly with the Applicant Representative or with an authoritative source within the Applicant's organization, such as the Applicant's main business offices, corporate offices, human resource offices, information technology offices, or other department that the CA deems appropriate.

In addition, the CA SHALL establish a process that allows an Applicant to specify the individuals who may request Certificates. If an Applicant specifies, in writing, the individuals who may request a Certificate, then the CA SHALL NOT accept any certificate requests that are outside this specification. The CA SHALL provide an Applicant with a list of its authorized certificate requesters upon the Applicant's verified written request.

11.2.4 Verification of Individual Applicant

If an Applicant subject to this Section 0 is a natural person, then the CA SHALL verify the Applicant's name, Applicant's address, and the authenticity of the certificate request.

The CA SHALL verify the Applicant's name using a legible copy, which discernibly shows the Applicant's face, of at least one currently valid government-issued photo ID (passport, drivers license, military ID, national ID, or equivalent document type). The CA SHALL inspect the copy for any indication of alteration or falsification.

The CA SHALL verify the Applicant's address using a form of identification that the CA determines to be reliable, such as a government ID, utility bill, or bank or credit card statement. The CA MAY rely on the same government-issued ID that was used to verify the Applicant's name.

The CA SHALL verify the certificate request with the Applicant using a Reliable Method of Communication.

11.2.5 Verification of Country

If the subject:countryName field is present, then the CA SHALL verify the country associated with the Subject using one of the following: (a) the IP Address range assignment by country for either (i) the web site's IP address, as indicated by the DNS record for the web site or (ii) the Applicant's IP address; (b) the ccTLD of the requested Domain Name; (c) information provided by the Domain Name Registrar; or (d) a method identified in Section 11.2.1. The CA SHOULD implement a process to screen proxy servers in order to prevent reliance upon IP addresses assigned in countries other than where the Applicant is actually located.

11.3 Age of Certificate Data

Section 9.4 limits the validity period of Subscriber Certificates. The CA MAY use the documents and data provided in Section 11 to verify certificate information, provide that the CA obtained the data or document from a source specified under Section 11 no more than thirty-nine (39) months prior to issuing the Certificate.

11.4 Denied List

In accordance with Section 15.3.2, the CA SHALL maintain an internal database of all previously revoked Certificates and previously rejected certificate requests due to suspected phishing or other fraudulent usage or concerns. The CA SHALL use this information to identify subsequent suspicious certificate requests.

11.5 High Risk Requests

The CA SHALL develop, maintain, and implement documented procedures that identify and require additional verification activity for High Risk Certificate Requests prior to the Certificate's approval, as reasonably necessary to ensure that such requests are properly verified under these Requirements.

11.6 Data Source Accuracy

Prior to using any data source as a Reliable Data Source, the CA SHALL evaluate the source for its reliability, accuracy, and resistance to alteration or falsification. The CA SHOULD consider the following during its evaluation:

1. The age of the information provided,
2. The frequency of updates to the information source,
3. The data provider and purpose of the data collection,
4. The public accessibility of the data availability, and
5. The relative difficulty in falsifying or altering the data.

Databases maintained by the CA, its owner, or its affiliated companies do not qualify as a Reliable Data Source if the primary purpose of the database is to collect information for the purpose of fulfilling the validation requirements under Section 11.

12. Certificate Issuance by a Root CA

Certificate issuance by the Root CA SHALL require an individual authorized by the CA (i.e. the CA system operator, system officer, or PKI administrator) to deliberately issue a direct command in order for the Root CA to perform a certificate signing operation.

Root CA Private Keys MUST NOT be used to sign Certificates except in the following cases:

1. Self-signed Certificates to represent the Root CA itself;
2. Certificates for Subordinate CAs and Cross Certificates;
3. Certificates for infrastructure purposes (e.g. administrative role certificates, internal CA operational device certificates, and OCSP Response verification Certificates);
4. Certificates issued solely for the purpose of testing products with Certificates issued by a Root CA; and
5. Subscriber Certificates, provided that:
    a. The Root CA uses a 1024-bit RSA signing key that was created prior to the Effective Date;
    b. The Applicant's application was deployed prior to the Effective Date;

c. The Applicant's application is in active use by the Applicant or the CA uses a documented process to establish that the Certificate's use is required by a substantial number of Relying Parties;

d. The CA follows a documented process to determine that the Applicant's application poses no known security risks to Relying Parties; and

e. The CA documents that the Applicant's application cannot be patched or replaced without substantial economic outlay.

13. Certificate Revocation and Status Checking

13.1 Revocation

13.1.1 Revocation Request

The CA SHALL provide a process for Subscribers to request revocation of their own Certificates. The process MUST be described in the CA's Certificate Policy or Certification Practice Statement. The CA SHALL maintain a continuous 24x7 ability to accept and respond to revocation requests and related inquiries.

13.1.2 Certificate Problem Reporting

The CA SHALL provide Subscribers, Relying Parties, Application Software Suppliers, and other third parties with clear instructions for reporting suspected Private Key Compromise, Certificate misuse, or other types of fraud, compromise, misuse, inappropriate conduct, or any other matter related to Certificates. The CA SHALL publicly disclose the instructions through a readily accessible online means.

13.1.3 Investigation

The CA SHALL begin investigation of a Certificate Problem Report within twenty-four hours of receipt, and decide whether revocation or other appropriate action is warranted based on at least the following criteria:

1. The nature of the alleged problem;
2. The number of Certificate Problem Reports received about a particular Certificate or Subscriber;
3. The entity making the complaint (for example, a complaint from a law enforcement official that a Web site is engaged in illegal activities should carry more weight than a complaint from a consumer alleging that she didn't receive the goods she ordered); and
4. Relevant legislation.

13.1.4 Response

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

13.1.5 Reasons for Revoking a Subscriber Certificate

The CA SHALL revoke a Certificate within 24 hours if one or more of the following occurs:

1. The Subscriber requests in writing that the CA revoke the Certificate;
2. The Subscriber notifies the CA that the original certificate request was not authorized and does not retroactively grant authorization;

3. The CA obtains evidence that the Subscriber's Private Key corresponding to the Public Key in the Certificate suffered a Key Compromise (also see Section 10.2.4) or no longer complies with the requirements of Appendix A;
4. The CA obtains evidence that the Certificate was misused;
5. The CA is made aware that a Subscriber has violated one or more of its material obligations under the Subscriber or Terms of Use Agreement;
6. The CA is made aware of any circumstance indicating that use of a Fully-Qualified Domain Name or IP address in the Certificate is no longer legally permitted (e.g. a court or arbitrator has revoked a Domain Name Registrant's right to use the Domain Name, a relevant licensing or services agreement between the Domain Name Registrant and the Applicant has terminated, or the Domain Name Registrant has failed to renew the Domain Name);
7. The CA is made aware that a Wildcard Certificate has been used to authenticate a fraudulently misleading subordinate Fully-Qualified Domain Name;
8. The CA is made aware of a material change in the information contained in the Certificate;
9. The CA is made aware that the Certificate was not issued in accordance with these Requirements or the CA's Certificate Policy or Certification Practice Statement;
10. The CA determines that any of the information appearing in the Certificate is inaccurate or misleading;
11. The CA ceases operations for any reason and has not made arrangements for another CA to provide revocation support for the Certificate;
12. The CA's right to issue Certificates under these Requirements expires or is revoked or terminated, unless the CA has made arrangements to continue maintaining the CRL/OCSP Repository;
13. The CA is made aware of a possible compromise of the Private Key of the Subordinate CA used for issuing the Certificate;
14. Revocation is required by the CA's Certificate Policy and/or Certification Practice Statement; or
15. The technical content or format of the Certificate presents an unacceptable risk to Application Software Suppliers or Relying Parties (e.g. the CA/Browser Forum might determine that a deprecated cryptographic/signature algorithm or key size presents an unacceptable risk and that such Certificates should be revoked and replaced by CAs within a given period of time).

13.1.6 Reasons for Revoking a Subordinate CA Certificate

The Issuing CA SHALL revoke a Subordinate CA Certificate within seven (7) days if one or more of the following occurs:

1. The Subordinate CA requests revocation in writing;
2. The Subordinate CA notifies the Issuing CA that the original certificate request was not authorized and does not retroactively grant authorization;
3. The Issuing CA obtains evidence that the Subordinate CA's Private Key corresponding to the Public Key in the Certificate suffered a Key Compromise or no longer complies with the requirements of Appendix A,
4. The Issuing CA obtains evidence that the Certificate was misused;
5. The Issuing CA is made aware that the Certificate was not issued in accordance with or that Subordinate CA has not complied with these Baseline Requirements or the applicable Certificate Policy or Certification Practice Statement;
6. The Issuing CA determines that any of the information appearing in the Certificate is inaccurate or misleading;

7. The Issuing CA or Subordinate CA ceases operations for any reason and has not made arrangements for another CA to provide revocation support for the Certificate;
8. The Issuing CA's or Subordinate CA's right to issue Certificates under these Requirements expires or is revoked or terminated, unless the Issuing CA has made arrangements to continue maintaining the CRL/OCSP Repository;
9. Revocation is required by the Issuing CA's Certificate Policy and/or Certification Practice Statement; or
10. The technical content or format of the Certificate presents an unacceptable risk to Application Software Suppliers or Relying Parties (e.g. the CA/Browser Forum might determine that a deprecated cryptographic/signature algorithm or key size presents an unacceptable risk and that such Certificates should be revoked and replaced by CAs within a given period of time).

13.2 Certificate Status Checking

13.2.1 Mechanisms

The CA SHALL make revocation information for Subordinate Certificates and Subscriber Certificates available in accordance with Appendix B.

If the Subscriber Certificate is for a high-traffic FQDN, the CA MAY rely on stapling, in accordance with [RFC4366], to distribute its OCSP responses. In this case, the CA SHALL ensure that the Subscriber "staples" the OCSP response for the Certificate in its TLS handshake. The CA SHALL enforce this requirement on the Subscriber either contractually, through the Subscriber or Terms of Use Agreement, or by technical review measures implement by the CA.

13.2.2 Repository

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

For the status of Subscriber Certificates:

1. If the CA publishes a CRL, then the CA SHALL update and reissue CRLs at least once every seven days, and the value of the nextUpdate field MUST NOT be more than ten days beyond the value of the thisUpdate field; and
2. The CA SHALL update information provided via an Online Certificate Status Protocol at least every four days. OCSP responses from this service MUST have a maximum expiration time of ten days.

For the status of Subordinate CA Certificates:

1. The CA SHALL update and reissue CRLs at least (i) once every twelve months and (ii) within 24 hours after revoking a Subordinate CA Certificate, and the value of the nextUpdate field MUST NOT be more than twelve months beyond the value of the thisUpdate field; and
2. The CA SHALL update information provided via an Online Certificate Status Protocol at least (i) every twelve months and (ii) within 24 hours after revoking a Subordinate CA Certificate.

Effective 1 January 2013, the CA SHALL support an OCSP capability using the GET method for Certificates issued in accordance with these Requirements.

13.2.3 Response Time

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

13.2.4 Deletion of Entries

Revocation entries on a CRL or OCSP Response MUST NOT be removed until after the Expiry Date of the revoked Certificate.

13.2.5 OCSP Signing

OCSP responses MUST conform to RFC2560 and/or RFC5019. OCSP responses MUST either:

1. Be signed by the CA that issued the Certificates whose revocation status is being checked, or
2. Be signed by an OCSP Responder whose Certificate is signed by the CA that issued the Certificate whose revocation status is being checked.

In the latter case, the OCSP signing Certificate MUST contain an extension of type id-pkix-ocsp-nocheck, as defined by RFC2560.

13.2.6 Response for non-issued certificates

If the OCSP responder receives a request for status of a certificate that has not been issued, then the responder SHOULD NOT respond with a "good" status. The CA SHOULD monitor the responder for such requests as part of its security response procedures.

Effective 1 August 2013, OCSP responders for CAs which are not Technically Constrained in line with Section 9.7 MUST NOT respond with a "good" status for such certificates.

13.2.7 Certificate Suspension

The Repository MUST NOT include entries that indicate that a Certificate is suspended.

14. Employees and Third Parties

14.1 Trustworthiness and Competence

14.1.1 Identity and Background Verification

Prior to the engagement of any person in the Certificate Management Process, whether as an employee, agent, or an independent contractor of the CA, the CA SHALL verify the identity and trustworthiness of such person.

14.1.2 Training and Skill Level

The CA SHALL provide all personnel performing information verification duties with skills-training that covers basic Public Key Infrastructure knowledge, authentication and vetting policies and procedures (including the CA's Certificate Policy and/or Certification Practice Statement), common threats to the information verification process (including phishing and other social engineering tactics), and these Requirements.

The CA SHALL maintain records of such training and ensure that personnel entrusted with Validation Specialist duties maintain a skill level that enables them to perform such duties satisfactorily.

Validation Specialists engaged in Certificate issuance SHALL maintain skill levels consistent with the CA's training and performance programs.

The CA SHALL document that each Validation Specialist possesses the skills required by a task before allowing the Validation Specialist to perform that task.

The CA SHALL require all Validation Specialists to pass an examination provided by the CA on the information verification requirements outlined in these Requirements.

14.2 Delegation of Functions

14.2.1 General

The CA MAY delegate the performance of all, or any part, of Section 11 of these Requirements to a Delegated Third Party, provided that the process as a whole fulfills all of the requirements of Section 11.

Before the CA authorizes a Delegated Third Party to perform a delegated function, the CA SHALL contractually require the Delegated Third Party to:

1) Meet the qualification requirements of Section 14.1, when applicable to the delegated function;
2) Retain documentation in accordance with Section 15.3.2;
3) Abide by the other provisions of these Requirements that are applicable to the delegated function; and
4) Comply with (a) the CA's Certificate Policy/Certification Practice Statement or (b) the Delegated Third Party's practice statement that the CA has verified complies with these Requirements.

The CA SHALL verify that the Delegated Third Party's personnel involved in the issuance of a Certificate meet the training and skills requirements of Section 14 and the document retention and event logging requirements of Section 15.

If a Delegated Third Party fulfills any of the CA's obligations under Section 11.5 (High Risk Requests), the CA SHALL verify that the process used by the Delegated Third Party to identify and further verify High Risk Certificate Requests provides at least the same level of assurance as the CA's own processes

14.2.2 Compliance Obligation

The CA SHALL internally audit each Delegated Third Party's compliance with these Requirements on an annual basis.

14.2.3 Allocation of Liability

For delegated tasks, the CA and any Delegated Third Party MAY allocate liability between themselves contractually as they determine, but the CA SHALL remain fully responsible for the performance of all parties in accordance with these Requirements, as if the tasks had not been delegated.

14.2.4 Enterprise RAs

The CA MAY designate an Enterprise RA to verify certificate requests from the Enterprise RA's own organization.

The CA SHALL NOT accept certificate requests authorized by an Enterprise RA unless the following requirements are satisfied:

1. The CA SHALL confirm that the requested Fully-Qualified Domain Name(s) are within the Enterprise RA's verified Domain Namespace (see Section 7.1.2 para 1).
2. If the certificate request includes a Subject name of a type other than a Fully-Qualified Domain Name, the CA SHALL confirm that the name is either that of the delegated enterprise, or an Affiliate of the delegated enterprise, or that the delegated enterprise is an agent of the named Subject. For example, the CA SHALL NOT issue a Certificate containing the Subject name "XYZ Co." on the authority of Enterprise RA "ABC Co.", unless the two companies are affiliated (see Section 11.1) or "ABC Co." is the agent of "XYZ Co". This requirement applies regardless of whether the accompanying requested Subject FQDN falls within the Domain Namespace of ABC Co.'s Registered Domain Name.

The CA SHALL impose these limitations as a contractual requirement on the Enterprise RA and monitor compliance by the Enterprise RA.

15. Data Records

15.1 Documentation and Event Logging

The CA and each Delegated Third Party SHALL record details of the actions taken to process a certificate request and to issue a Certificate, including all information generated and documentation received in connection with the certificate request; the time and date; and the personnel involved. The CA SHALL make these records available to its Qualified Auditor as proof of the CA's compliance with these Requirements.

15.2 Events and Actions

The CA SHALL record at least the following events:

1. CA key lifecycle management events, including:
    a. Key generation, backup, storage, recovery, archival, and destruction; and
    b. Cryptographic device lifecycle management events.
2. CA and Subscriber Certificate lifecycle management events, including:
    a. Certificate requests, renewal, and re-key requests, and revocation;
    b. All verification activities stipulated in these Requirements and the CA's Certification Practice Statement;
    c. Date, time, phone number used, persons spoken to, and end results of verification telephone calls;
    d. Acceptance and rejection of certificate requests;
    e. Issuance of Certificates; and
    f. Generation of Certificate Revocation Lists and OCSP entries.
3. Security events, including:
    a. Successful and unsuccessful PKI system access attempts;
    b. PKI and security system actions performed;
    c. Security profile changes;
    d. System crashes, hardware failures, and other anomalies;
    e. Firewall and router activities; and
    f. Entries to and exits from the CA facility.

Log entries MUST include the following elements:

1. Date and time of entry;
2. Identity of the person making the journal entry; and
3. Description of the entry.

15.3 Retention

15.3.1 Audit Log Retention

The CA SHALL retain any audit logs generated after the Effective Date for at least seven years. The CA SHALL make these audit logs available to its Qualified Auditor upon request.

15.3.2 Documentation Retention

The CA SHALL retain all documentation relating to certificate requests and the verification thereof, and all Certificates and revocation thereof, for at least seven years after any Certificate based on that documentation ceases to be valid.

16. Data Security

16.1 Objectives

The CA SHALL develop, implement, and maintain a comprehensive security program designed to:

1. Protect the confidentiality, integrity, and availability of Certificate Data and Certificate Management Processes;
2. Protect against anticipated threats or hazards to the confidentiality, integrity, and availability of the Certificate Data and Certificate Management Processes;
3. Protect against unauthorized or unlawful access, use, disclosure, alteration, or destruction of any Certificate Data or Certificate Management Processes;
4. Protect against accidental loss or destruction of, or damage to, any Certificate Data or Certificate Management Processes; and
5. Comply with all other security requirements applicable to the CA by law.

16.2 Risk Assessment

The CA's security program MUST include an annual Risk Assessment that:

1. Identifies foreseeable internal and external threats that could result in unauthorized access, disclosure, misuse, alteration, or destruction of any Certificate Data or Certificate Management Processes;
2. Assesses the likelihood and potential damage of these threats, taking into consideration the sensitivity of the Certificate Data and Certificate Management Processes; and
3. Assesses the sufficiency of the policies, procedures, information systems, technology, and other arrangements that the CA has in place to counter such threats.

16.3 Security Plan

Based on the Risk Assessment, the CA SHALL develop, implement, and maintain a security plan consisting of security procedures, measures, and products designed to achieve the objectives set forth above and to manage and control the risks identified during the Risk Assessment, commensurate with the sensitivity of the Certificate Data and Certificate Management Processes. The security plan MUST include administrative, organizational, technical, and physical safeguards appropriate to the sensitivity of the Certificate Data and Certificate Management Processes. The security plan MUST also take into account then-available technology and the cost of implementing the specific measures, and SHALL implement a reasonable level of security appropriate to the harm that might result from a breach of security and the nature of the data to be protected.

16.4 Business Continuity

In addition, the CA SHALL document a business continuity and disaster recovery procedures designed to notify and reasonably protect Application Software Suppliers, Subscribers, and Relying Parties in the event of a disaster, security compromise, or business failure. The CA is not required to publicly disclose its business continuity plans but SHALL make the business continuity plan and security plan of Section 15.3 available to the CA's auditors upon request. The CA SHALL annually test, review, and update these procedures.

The business continuity plan MUST include:

1. The conditions for activating the plan,
2. Emergency procedures,
3. Fallback procedures,
4. Resumption procedures,
5. A maintenance schedule for the plan;
6. Awareness and education requirements;
7. The responsibilities of the individuals;
8. Recovery time objective (RTO);
9. Regular testing of contingency plans.
10. The CA's plan to maintain or restore the CA's business operations in a timely manner following interruption to or failure of critical business processes
11. A requirement to store critical cryptographic materials (i.e., secure cryptographic device and activation materials) at an alternate location;
12. What constitutes an acceptable system outage and recovery time
13. How frequently backup copies of essential business information and software are taken;
14. The distance of recovery facilities to the CA's main site; and
15. Procedures for securing its facility to the extent possible during the period of time following a disaster and prior to restoring a secure environment either at the original or a remote site.

16.5 System Security[1]

The Certificate Management Process MUST include:

1. physical security and environmental controls;
2. system integrity controls, including configuration management, integrity maintenance of trusted code, and malware detection/prevention;
3. network security and firewall management, including port restrictions and IP address filtering;
4. user management, separate trusted-role assignments, education, awareness, and training; and
5. logical access controls, activity logging, and inactivity time-outs to provide individual accountability.

The CA SHALL enforce multi-factor authentication for all accounts capable of directly causing certificate issuance.

16.6 Private Key Protection

The CA SHALL protect its Private Key in a system or device that has been validated as meeting at least FIPS 140 level 3 or an appropriate Common Criteria Protection Profile or Security Target, EAL 4 (or higher), which includes requirements to protect the Private Key and other assets against known threats. The CA SHALL implement physical and logical safeguards to prevent unauthorized certificate issuance. Protection of the Private Key outside the validated system or device specified above MUST consist of physical security, encryption, or a combination of both, implemented in a manner that prevents disclosure of the Private Key. The CA SHALL encrypt its Private Key with an algorithm and key-length that, according to the state of the art, are capable of withstanding cryptanalytic attacks for the residual life of the encrypted key or key part. The Private Key SHALL be backed up, stored, and recovered only by personnel in trusted roles using, at least, dual control in a physically secured environment.

17. Audit

[1] The CA/Browser Forum will enact additional security requirements after the adoption of v1.0 of the Requirements.

Certificates that are capable of being used to issue new certificates MUST either be Technically Constrained in line with section 9.7 and audited in line with section 17.9 only, or Unconstrained and fully audited in line with all remaining requirements from section 17. A Certificate is deemed as capable of being used to issue new certificates if it contains an X.509v3 basicConstraints extension, with the cA boolean set to true and is therefore by definition a Root CA Certificate or a Subordinate CA Certificate.

17.1 Eligible Audit Schemes

The CA SHALL undergo an audit in accordance with one of the following schemes:

1. WebTrust for Certification Authorities v2.0;
2. A national scheme that audits conformance to ETSI TS 102 042;
3. A scheme that audits conformance to ISO 21188:2006; or
4. If a Government CA is required by its Certificate Policy to use a different internal audit scheme, it MAY use such scheme provided that the audit either (a) encompasses all requirements of one of the above schemes or (b) consists of comparable criteria that are available for public review.

Whichever scheme is chosen, it MUST incorporate periodic monitoring and/or accountability procedures to ensure that its audits continue to be conducted in accordance with the requirements of the scheme.

The audit MUST be conducted by a Qualified Auditor, as specified in Section 17.6.

17.2 Audit Period

The period during which the CA issues Certificates SHALL be divided into an unbroken sequence of audit periods. An audit period MUST NOT exceed one year in duration.

17.3 Audit Report

The Audit Report SHALL state explicitly that it covers the relevant systems and processes used in the issuance of all Certificates that assert one or more of the policy identifiers listed in Section 9.3.1. The CA SHALL make the Audit Report publicly available. The CA is not required to make publicly available any general audit findings that do not impact the overall audit opinion. For both government and commercial CAs, the CA SHOULD make its Audit Report publicly available no later than three months after the end of the audit period. In the event of a delay greater than three months, and if so requested by an Application Software Supplier, the CA SHALL provide an explanatory letter signed by the Qualified Auditor.

17.4 Pre-Issuance Readiness Audit

If the CA has a currently valid Audit Report indicating compliance with an audit scheme listed in Section 17.1, then no pre-issuance readiness assessment is necessary.

If the CA does not have a currently valid Audit Report indicating compliance with one of the audit schemes listed in Section 17.1, then, before issuing Publicly-Trusted Certificates, the CA SHALL successfully complete a point-in-time readiness assessment performed in accordance with applicable standards under one of the audit schemes listed in Section 17.1. The point-in-time readiness assessment SHALL be completed no earlier than twelve (12) months prior to issuing Publicly-Trusted Certificates and SHALL be followed by a complete audit under such scheme within ninety (90) days of issuing the first Publicly-Trusted Certificate.

17.5 Audit of Delegated Functions

If a Delegated Third Party is not currently audited in accordance with Section 17 and is not an Enterprise RA, then prior to certificate issuance the CA SHALL ensure that the domain control validation process required under Section 11.1 has been properly performed by the Delegated Third Party by either (1) using an out-of-band mechanism involving at least one human who is acting either on behalf of the CA or on behalf of the Delegated Third Party to

confirm the authenticity of the certificate request or the information supporting the certificate request or (2) performing the domain control validation process itself.

If the CA is not using one of the above procedures and the Delegated Third Party is not an Enterprise RA, then the CA SHALL obtain an audit report, issued under the auditing standards that underlie the accepted audit schemes found in Section 17.1, that provides an opinion whether the Delegated Third Party's performance complies with either the Delegated Third Party's practice statement or the CA's Certificate Policy and/or Certification Practice Statement. If the opinion is that the Delegated Third Party does not comply, then the CA SHALL not allow the Delegated Third Party to continue performing delegated functions.

The audit period for the Delegated Third Party SHALL NOT exceed one year (ideally aligned with the CA's audit). However, if the CA or Delegated Third Party is under the operation, control, or supervision of a Government Entity and the audit scheme is completed over multiple years, then the annual audit MUST cover at least the core controls that are required to be audited annually by such scheme plus that portion of all non-core controls that are allowed to be conducted less frequently, but in no case may any non-core control be audited less often than once every three years.

17.6 Auditor Qualifications

The CA's audit SHALL be performed by a Qualified Auditor. A Qualified Auditor means a natural person, Legal Entity, or group of natural persons or Legal Entities that collectively possess the following qualifications and skills:

1. Independence from the subject of the audit;
2. The ability to conduct an audit that addresses the criteria specified in an Eligible Audit Scheme (see Section 17.1);
3. Employs individuals who have proficiency in examining Public Key Infrastructure technology, information security tools and techniques, information technology and security auditing, and the third-party attestation function;
4. (For audits conducted in accordance with any one of the ETSI standards) accredited in accordance with Annex E of ETSI TS ~~119 403~~102 042~~, or accredited to conduct such audits under an equivalent national scheme, or accredited by a national accreditation body in line with ISO 27006 to carry out ISO 27001 audits~~;
5. (For audits conducted in accordance with the WebTrust standard) licensed by WebTrust;
6. Bound by law, government regulation, or professional code of ethics; and
7. Except in the case of an Internal Government Auditing Agency, maintains Professional Liability/Errors & Omissions insurance with policy limits of at least one million US dollars in coverage.

17.7 Key Generation Ceremony

For Root CA Key Pairs created after the Effective Date that are either (i) used as Root CA Key Pairs or (ii) Key Pairs generated for a subordinate CA that is not the operator of the Root CA or an Affiliate of the Root CA, the CA SHALL:

1. prepare and follow a Key Generation Script,
2. have a Qualified Auditor witness the Root CA Key Pair generation process or record a video of the entire Root CA Key Pair generation process, and
3. have a Qualified Auditor issue a report opining that the CA followed its key ceremony during its Key and Certificate generation process and the controls used to ensure the integrity and confidentiality of the Key Pair.

For other CA Key Pairs created after the Effective Date that are for the operator of the Root CA or an Affiliate of the Root CA, the CA SHOULD:

1. prepare and follow a Key Generation Script and

2. have a Qualified Auditor witness the Root CA Key Pair generation process or record a video of the entire Root CA Key Pair generation process.

In all cases, the CA SHALL:

1. generate the keys in a physically secured environment as described in the CA's Certificate Policy and/or Certification Practice Statement;
2. generate the CA keys using personnel in trusted roles under the principles of multiple person control and split knowledge;
3. generate the CA keys within cryptographic modules meeting the applicable technical and business requirements as disclosed in the CA's Certificate Policy and/or Certification Practice Statement;
4. log its CA key generation activities; and
5. maintain effective controls to provide reasonable assurance that the Private Key was generated and protected in conformance with the procedures described in its Certificate Policy and/or Certification Practice Statement and (if applicable) its Key Generation Script.

17.8 Regular Quality Assessment Self Audits

During the period in which the CA issues Certificates, the CA SHALL monitor adherence to its Certificate Policy, Certification Practice Statement and these Requirements and strictly control its service quality by performing self audits on at least a quarterly basis against a randomly selected sample of the greater of one certificate or at least three percent of the Certificates issued by it during the period commencing immediately after the previous self-audit sample was taken. Except for Delegated Third Parties that undergo an annual audit that meets the criteria specified in Section 16.3, the CA SHALL strictly control the service quality of Certificates issued or containing information verified by a Delegated Third Party by having a Validation Specialist employed by the CA perform ongoing quarterly audits against a randomly selected sample of at least the greater of one certificate or three percent of the Certificates verified by the Delegated Third Party in the period beginning immediately after the last sample was taken. The CA SHALL review each Delegated Third Party's practices and procedures to ensure that the Delegated Third Party is in compliance with these Requirements and the relevant Certificate Policy and/or Certification Practice Statement.

17.9 Regular Quality Assessment of Technically Constrained Subordinate CAs

During the period in which a Technically Constrained Subordinate CA issues Certificates, the CA which signed the Subordinate CA SHALL monitor adherence to the CA's Certificate Policy and the Subordinate CA's Certification Practice Statement. On at least a quarterly basis, against a randomly selected sample of the greater of one certificate or at least three percent of the Certificates issued by the Subordinate CA, during the period commencing immediately after the previous audit sample was taken, the CA shall ensure all applicable Baseline Requirements are met.

18. Liability and Indemnification

18.1 Liability to Subscribers and Relying Parties

If the CA has issued and managed the Certificate in compliance with these Requirements and its Certificate Policy and/or Certification Practice Statement, the CA MAY disclaim liability to the Certificate Beneficiaries or any other third parties for any losses suffered as a result of use or reliance on such Certificate beyond those specified in the CA's Certificate Policy and/or Certification Practice Statement. If the CA has not issued or managed the Certificate in compliance with these Requirements and its Certificate Policy and/or Certification Practice Statement, the CA MAY seek to limit its liability to the Subscriber and to Relying Parties, regardless of the cause of action or legal theory involved, for any and all claims, losses or damages suffered as a result of the use or reliance on such Certificate by any appropriate means that the CA desires. If the CA chooses to limit its liability for Certificates that

are not issued or managed in compliance with these Requirements or its Certificate Policy and/or Certification Practice Statement, then the CA SHALL include the limitations on liability in the CA's Certificate Policy and/or Certification Practice Statement.

18.2 Indemnification of Application Software Suppliers

Notwithstanding any limitations on its liability to Subscribers and Relying Parties, the CA understands and acknowledges that the Application Software Suppliers who have a Root Certificate distribution agreement in place with the Root CA do not assume any obligation or potential liability of the CA under these Requirements or that otherwise might exist because of the issuance or maintenance of Certificates or reliance thereon by Relying Parties or others. Thus, except in the case where the CA is a government entity, the CA SHALL defend, indemnify, and hold harmless each Application Software Supplier for any and all claims, damages, and losses suffered by such Application Software Supplier related to a Certificate issued by the CA, regardless of the cause of action or legal theory involved. This does not apply, however, to any claim, damages, or loss suffered by such Application Software Supplier related to a Certificate issued by the CA where such claim, damage, or loss was directly caused by such Application Software Supplier's software displaying as not trustworthy a Certificate that is still valid, or displaying as trustworthy: (1) a Certificate that has expired, or (2) a Certificate that has been revoked (but only in cases where the revocation status is currently available from the CA online, and the application software either failed to check such status or ignored an indication of revoked status).

18.3 Root CA Obligations

The Root CA SHALL be responsible for the performance and warranties of the Subordinate CA, for the Subordinate CA's compliance with these Requirements, and for all liabilities and indemnification obligations of the Subordinate CA under these Requirements, as if the Root CA were the Subordinate CA issuing the Certificates.

Appendix A - Cryptographic Algorithm and Key Requirements (Normative)

Certificates MUST meet the following requirements for algorithm type and key size.

(1) Root CA Certificates

	Validity period beginning on or before 31 Dec 2010	Validity period beginning after 31 Dec 2010
Digest algorithm	MD5 (NOT RECOMMENDED), SHA-1, SHA-256, SHA-384 or SHA-512	SHA-1*, SHA-256, SHA-384 or SHA-512
Minimum RSA modulus size (bits)	2048**	2048
ECC curve	NIST P-256, P-384, or P-521	NIST P-256, P-384, or P-521
Minimum DSA modulus and divisor size (bits) ***	L= 2048, N= 224 or L= 2048, N= 256	L= 2048, N= 224 or L= 2048, N= 256

(2) Subordinate CA Certificates

	Validity period beginning on or before 31 Dec 2010 and ending on or before 31 Dec 2013	Validity period beginning after 31 Dec 2010 or ending after 31 Dec 2013
Digest algorithm	SHA-1, SHA-256, SHA-384 or SHA-512	SHA-1*, SHA-256, SHA-384 or SHA-512
Minimum RSA modulus size (bits)	1024	2048
ECC curve	NIST P-256, P-384, or P-521	NIST P-256, P-384, or P-521
Minimum DSA modulus and divisor size (bits)***	L= 2048, N= 224 or L= 2048, N= 256	L= 2048, N= 224 or L= 2048, N= 256

(3) Subscriber Certificates

	Validity period ending on or before 31 Dec 2013	Validity period ending after 31 Dec 2013
Digest algorithm	SHA1*, SHA-256, SHA-384 or SHA-512	SHA1*, SHA-256, SHA-384 or SHA-512
Minimum RSA modulus	1024	2048

size (bits)		
ECC curve	NIST P-256, P-384, or P-521	NIST P-256, P-384, or P-521
Minimum DSA modulus and divisor size (bits)***	L= 2048, N= 224 or L= 2048, N= 256	L= 2048, N= 224 or L= 2048, N= 256

* SHA-1 MAY be used with RSA keys in accordance with the criteria defined in Section 9.4.2.

** A Root CA Certificate issued prior to 31 Dec. 2010 with an RSA key size less than 2048 bits MAY still serve as a trust anchor for Subscriber Certificates issued in accordance with these Requirements.

*** L and N (the bit lengths of modulus p and divisor q, respectively) are described in the Digital Signature Standard, FIPS 186-4 (http://nvlpubs.nist.gov/nistpubs/FIPS/NIST.FIPS.186-4.pdf).

(4) General requirements for public keys

RSA: The CA SHALL confirm that the value of the public exponent is an odd number equal to 3 or more. Additionally, the public exponent SHOULD be in the range between $2^{16}+1$ and $2^{256}-1$. The modulus SHOULD also have the following characteristics: an odd number, not the power of a prime, and have no factors smaller than 752. [Source: Section 5.3.3, NIST SP 800-89].

DSA: Although FIPS 800-57 says that domain parameters may be made available at some accessible site, compliant DSA certificates MUST include all domain parameters. This is to insure maximum interoperability among relying party software. The CA MUST confirm that the value of the public key has the unique correct representation and range in the field, and that the key has the correct order in the subgroup. [Source: Section 5.3.1, NIST SP 800-89].

ECC: The CA SHOULD confirm the validity of all keys using either the ECC Full Public Key Validation Routine or the ECC Partial Public Key Validation Routine. [Source: Sections 5.6.2.5 and 5.6.2.6, respectively, NIST SP 800-56A].

Appendix B – Certificate Content and Extensions; Application of RFC 5280 (Normative)

This appendix specifies the additional requirements for Certificate content and extensions for Certificates generated after the Effective Date.

(1) Root CA Certificate

Root Certificates MUST be of type X.509 v3.

A. basicConstraints

This extension MUST appear as a critical extension. The cA field MUST be set true. The pathLenConstraint field SHOULD NOT be present.

B. keyUsage

This extension MUST be present and MUST be marked critical. Bit positions for keyCertSign and cRLSign MUST be set. If the Root CA Private Key is used for signing OCSP responses, then the digitalSignature bit MUST be set.

C. certificatePolicies

This extension SHOULD NOT be present.

D. extendedKeyUsage

This extension MUST NOT be present.

(2) Subordinate CA Certificate

Subordinate CA Certificates MUST be of type X.509 v3.

A. certificatePolicies

This extension MUST be present and SHOULD NOT be marked critical.

certificatePolicies:policyIdentifier (Required)

The following fields MAY be present if the Subordinate CA is not an Affiliate of the entity that controls the Root CA.

certificatePolicies:policyQualifiers:policyQualifierId (Optional)

- id-qt 1 [RFC 5280].

certificatePolicies:policyQualifiers:qualifier:cPSuri (Optional)

- HTTP URL for the Root CA's Certificate Policies, Certification Practice Statement, Relying Party Agreement, or other pointer to online policy information provided by the CA.

B. cRLDistributionPoints

This extension MUST be present and MUST NOT be marked critical. It MUST contain the HTTP URL of the CA's CRL service.

C. authorityInformationAccess

With the exception of stapling, which is noted below, this extension MUST be present. It MUST NOT be marked critical, and it MUST contain the HTTP URL of the Issuing CA's OCSP responder (accessMethod = 1.3.6.1.5.5.7.48.1). It SHOULD also contain the HTTP URL of the Issuing CA's certificate (accessMethod = 1.3.6.1.5.5.7.48.2). See Section 13.2.1 for details.

The HTTP URL of the Issuing CA's OCSP responder MAY be omitted, provided that the Subscriber "staples" the OCSP response for the Certificate in its TLS handshakes [RFC4366].

D. basicConstraints

This extension MUST be present and MUST be marked critical. The cA field MUST be set true. The pathLenConstraint field MAY be present.

E. keyUsage

This extension MUST be present and MUST be marked critical. Bit positions for keyCertSign and cRLSign MUST be set. If the Subordinate CA Private Key is used for signing OCSP responses, then the digitalSignature bit MUST be set.

F. nameConstraints (optional)

If present, this extension SHOULD be marked critical*.

* Non-critical Name Constraints are an exception to RFC 5280 (4.2.1.10), however, they MAY be used until the Name Constraints extension is supported by Application Software Suppliers whose software is used by a substantial portion of Relying Parties worldwide.

G. extkeyUsage (optional)

For Subordinate CA Certificates to be Technically constrained in line with section 9.7, then either the value id-kp-serverAuth [RFC5280] or id-kp-clientAuth [RFC5280] or both values MUST be present**.

Other values MAY be present.

If present, this extension SHOULD be marked non-critical.

** Generally Extended Key Usage will only appear within end entity certificates (as highlighted in RFC 5280 (4.2.1.12)), however, Subordinate CAs MAY include the extension to further protect relying parties until the use of the extension is consistent between Application Software Suppliers whose software is used by a substantial portion of Relying Parties worldwide.

(3) Subscriber Certificate

A. certificatePolicies

This extension MUST be present and SHOULD NOT be marked critical.

certificatePolicies:policyIdentifier (Required)

- A Policy Identifier, defined by the issuing CA, that indicates a Certificate Policy asserting the issuing CA's adherence to and compliance with these Requirements.

The following extensions MAY be present:

certificatePolicies:policyQualifiers:policyQualifierId (Recommended)

- id-qt 1 [RFC 5280].

certificatePolicies:policyQualifiers:qualifier:cPSuri (Optional)

- HTTP URL for the Subordinate CA's Certification Practice Statement, Relying Party Agreement or other pointer to online information provided by the CA.

B. cRLDistributionPoints

This extension MAY be present. If present, it MUST NOT be marked critical, and it MUST contain the HTTP URL of the CA's CRL service. See Section 13.2.1 for details.

C. authorityInformationAccess

With the exception of stapling, which is noted below, this extension MUST be present. It MUST NOT be marked critical, and it MUST contain the HTTP URL of the Issuing CA's OCSP responder (accessMethod = 1.3.6.1.5.5.7.48.1). It SHOULD also contain the HTTP URL of the Issuing CA's certificate (accessMethod = 1.3.6.1.5.5.7.48.2). See Section 13.2.1 for details.

The HTTP URL of the Issuing CA's OCSP responder MAY be omitted provided that the Subscriber "staples" OCSP responses for the Certificate in its TLS handshakes [RFC4366].

D. basicConstraints (optional)

If present, the cA field MUST be set false.

E. keyUsage (optional)

If present, bit positions for keyCertSign and cRLSign MUST NOT be set.

F. extKeyUsage (required)

Either the value id-kp-serverAuth [RFC5280] or id-kp-clientAuth [RFC5280] or both values MUST be present. id-kp-emailProtection [RFC5280] MAY be present. Other values SHOULD NOT be present.

(4) All Certificates

All other fields and extensions MUST be set in accordance with RFC 5280. The CA SHALL NOT issue a Certificate that contains a keyUsage flag, extendedKeyUsage value, Certificate extension, or other data not specified in this Appendix B unless the CA is aware of a reason for including the data in the Certificate.

CAs SHALL NOT issue a Certificate with:

(a) Extensions that do not apply in the context of the public Internet (such as an extendedKeyUsage value for a service that is only valid in the context of a privately managed network), unless:

i. such value falls within an OID arc for which the Applicant demonstrates ownership, or

ii. the Applicant can otherwise demonstrate the right to assert the data in a public context; or

(b) semantics that, if included, will mislead a Relying Party about the certificate information verified by the CA (such as including extendedKeyUsage value for a smart card, where the CA is not able to verify that the corresponding Private Key is confined to such hardware due to remote issuance).

(5) Application of RFC 5280

For purposes of clarification, a Precertificate, as described in RFC 6962 – Certificate Transparency, shall not be considered to be a "certificate" subject to the requirements of RFC 5280 - Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile under these Baseline Requirements.

Appendix C - User Agent Verification (Normative)

The CA SHALL host test Web pages that allow Application Software Suppliers to test their software with Subscriber Certificates that chain up to each publicly trusted Root Certificate. At a minimum, the CA SHALL host separate Web pages using Subscriber Certificates that are (i) valid, (ii) revoked, and (iii) expired.