

# Certificate Policy and Practice Statement for the NCSA CA

National Center for Supercomputing Applications (NCSA)

Version 1.6 (Tue Dec 14 13:11:27 CST 2010)

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# 1 INTRODUCTION

## 1.1 Overview

This Certificate Policy and Practice Statement (herein referred to as the “Policy”) specifies minimum requirements for the issuance and management of digital certificates that shall be used in authenticating users accessing resources of the National Center for Supercomputing Applications at the University of Illinois (herein referred to as “NCSA”) and the resources of other entities (relying parties) which accept those certificates. The Policy is issued and administered under the authority of the NCSA Policy Management Authority (herein referred to as the “PMA”; see Section 1.4.2 for contact details). This document is structured according to Internet Engineering Task Force RFC 3647 (Internet X.509 Public Key Infrastructure Certificate Policy and Certification Practices Framework).

NCSA runs three CAs. Each CA has its own private key and certificate. It is expected that relying parties will trust all NCSA CAs, though a relying party may choose to trust any NCSA CA separately. These CAs taken together along with the associated software and repositories used to distribute policies, CRLs and the like, are referred to as the “NCSA PKI”. One CA issues only short-lived certificates (with 11 days or shorter lifetime) to users based on Kerberos authentication and is henceforth referred to as the “NCSA Short-lived Certificate Service” or “NCSA-SLCS”. One CA issues only short-lived certificates (with 11 days or shorter lifetime) to users based on federated web authentication and is henceforth referred to as the “NCSA GridShib CA” or “NCSA-GSCA”. One CA is a traditional CA that issues long-lived certificates to hosts, services and users requiring long-lived certificates. This CA is henceforth referred to as the “NCSA-CA”. It is expected that users will use the NCSA-SLCS and NCSA-GSCA for user certificates unless they have some need for a long-lived certificate from the NCSA-CA.

This document covers the policy that applies to the NCSA-CA. Figure 1 illustrates the overall architecture of the NCSA-CA. The CA is integrated with the NCSA user database and Kerberos authentication service for identity management. The NCSA accounting process enrolls users in the user database, creates a Kerberos account with an initial default password for them, and assigns them a distinguished name.

To obtain credentials, NCSA-CA subscribers run software on the host where their credentials are to be stored. The software generates the subscriber’s private key locally, authenticates the user to the NCSA-CA via Kerberos and their “default password” (two authentication factors), issues a signed certificate request to the CA, and, if the request is approved, receives a signed certificate from the CA.

The NCSA-CA looks up the distinguished name in the user database that corresponds to the user’s authenticated Kerberos identity and issues a certificate with the appropriate distinguished name. For host and service certificate requests, the NCSA-CA also queries the NCSA Host database, maintained by NCSA networking staff, to verify the authenticated user is a registered administrator for the requested host. Further policy and implementation details are provided throughout the document.

## 1.2 Document name and identification

Document title: Certificate Policy and Practice Statement for the NCSA CA  
This Policy is published at: <http://security.ncsa.illinois.edu/CA/>  
Document version: 1.6  
Document date: Tue Dec 14 13:11:27 CST 2010  
OID: 1.3.6.1.4.1.4670.100.1.6

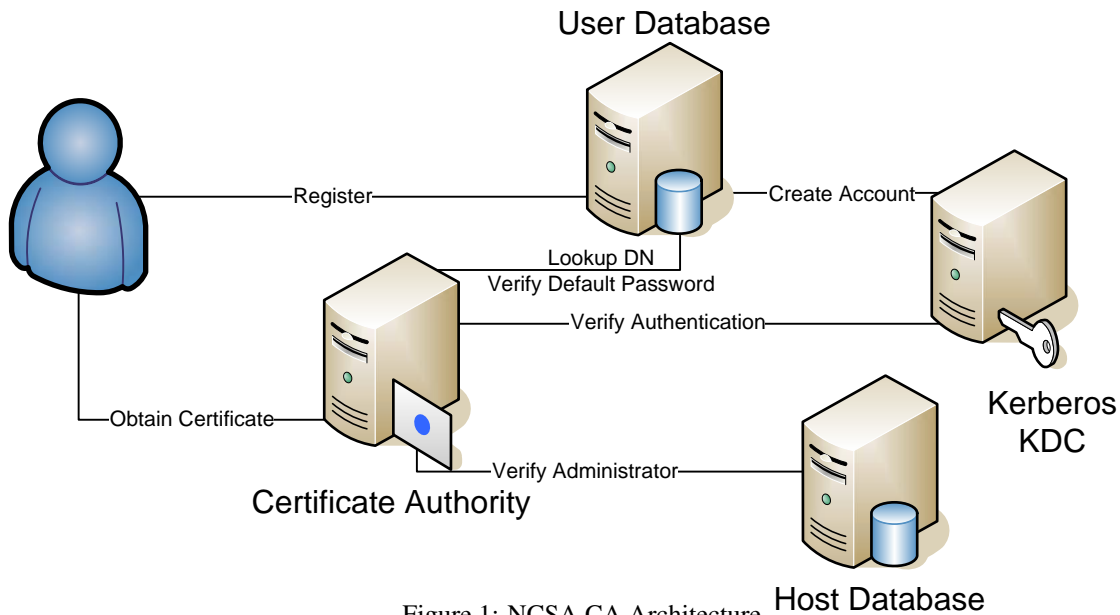


Figure 1: NCSA CA Architecture

## 1.3 PKI participants

### 1.3.1 Certification authorities

This policy is valid for the NCSA-CA. The NCSA-CA will only sign end entity certificates. There are no subordinate CAs.

### 1.3.2 Registration authorities

NCSA allocations group staff serve as registration authorities for the NCSA-CA. They enroll users in the NCSA user database according to the enrollment process described in Section 4.1.2, create Kerberos accounts for new users, assign a default password for the account, and assign distinguished names to new users according to Section 3.1.

The NCSA-CA uses the Kerberos service to authenticate requests and queries the database to obtain the proper distinguished name for authenticated requesters. The NCSA-CA also uses the database to authenticate users' default passwords as a "second authentication factor". The NCSA user database and Kerberos service are used to authenticate NCSA's users and staff for access to NCSA high-performance computing resources, NCSA's email services and other production services.

Users are instructed to change their default password immediately upon receiving their account information and to keep their default password in a secure place for later reference. In the event that their current password is forgotten, it will be reset to this default. The default password is used as a "second authentication factor" in certificate requests, along with the user's current Kerberos password.

NCSA networking group staff serve a registration authority role for host and service certificate requests by maintaining a database of all NCSA hosts and their authorized system administrator(s). This allows requests for service certificates from a host's authorized administrator (authenticated via Kerberos) to be automatically processed. Requests for hosts that do not appear in this database (e.g., services run by NCSA collaborators) will be manually vetted by NCSA



operations staff.

### **1.3.3 Subscribers**

The NCSA-CA will serve the needs of the NCSA community by providing NCSA users and employees with x509v3 digital certificates. These certificates may be used for the purpose of authentication, encryption, and digital signing by those individuals to whom the certificates have been issued.

The CA will also issue server and service certificates to computers operating within the NCSA administrative domain and to computer systems from other domains that are providing services in support of NCSA projects.

### **1.3.4 Relying parties**

NCSA places no restrictions on who may accept certificates it issues.

### **1.3.5 Other participants**

No stipulation.

## **1.4 Certificate usage**

### **1.4.1 Appropriate certificate uses**

One of the purposes of this policy is to promote a wide use of public-key certificates in many different applications. These applications may include, but are not limited to, login authentication, job submission authentication, encrypted e-mail, and SSL/TLS encryption for applications capable of making use of these technologies.

### **1.4.2 Prohibited certificate uses**

Other uses of NCSA-CA certificates are not prohibited, but neither are they supported.

## **1.5 Policy administration**

### **1.5.1 Organization administering the document**

This policy is administered by the National Center for Supercomputing Applications at the University of Illinois, 1205 W. Clark, Urbana IL 61801 USA.

This policy is accredited by The Americas Grid Policy Management Authority (TAGPMA), a member of the International Grid Trust Federation (IGTF).

### **1.5.2 Contact person**

The point of contact for this Policy and other matters related to the NCSA-CA is the Head of Security Operations for NCSA:

James J. Barlow

Phone number: +1 217-244-6403

Postal address: 1205 W. Clark, Urbana IL 61801 USA

E-mail address: jbarlow@ncsa.illinois.edu

After hours contact information:

NCSA Security Operations and Incident Response: security@ncsa.illinois.edu

NCSA 24x7 Operations: +1 217-244-0710

### **1.5.3 Person determining CPS suitability for the policy**

The Head of Security Operations for NCSA leads the PMA for the CA and is ultimately responsible for determining the suitability of the CPS.

As an accredited policy of the TAGPMA, all policy changes are subject to TAGPMA review and approval.

### **1.5.4 CPS approval procedures**

As determined by TAGPMA and the Head of Security Operations for NCSA.

## **1.6 Definitions and acronyms**

**Certification Authority (CA)** - An authority trusted by one or more users to create and assign public key certificates. Optionally the CA may create the user's keys. It is important to note that the CA is responsible for the public key certificates during their whole lifetime, not just for issuing them.

**CA-certificate** - A certificate for one CA's public key issued by another CA or self signed.

**Certificate policy (CP)** - A named set of rules that indicates the applicability of a certificate to a particular community and/or class of application with common security requirements. For example, a particular certificate policy might indicate applicability of a type of certificate to the authentication of electronic data interchange transactions for the trading of goods within a given price range.

**Certification path** - An ordered sequence of certificates which, together with the public key of the initial object in the path, can be processed to obtain that of the final object in the path.

**Certification Practice Statement (CPS)** - A statement of the practices, which a certification authority employs in issuing certificates.

**Certificate revocation list (CRL)** - A CRL is a time stamped list identifying revoked certificates, which is signed by a CA and made freely available in a public repository.

**Issuing certification authority (issuing CA)** - In the context of a particular certificate, the issuing CA is the CA that

issued the certificate (see also Subject certification authority).

Public Key Certificate (PKC) - A data structure containing the public key of an end entity and some other information, which is digitally signed with the private key of the CA which issued it.

Public Key Infrastructure (PKI) - The set of hardware, software, people, policies and procedures needed to create, manage, store, distribute, and revoke PKCs based on public-key cryptography.

Registration authority (RA) - An entity that is responsible for identification and authentication of certificate subjects, but that does not sign or issue certificates (i.e., an RA is delegated certain tasks on behalf of a CA). Note: The term Local Registration Authority (LRA) is used elsewhere for the same concept.

Relying party - A recipient of a certificate who acts in reliance on that certificate and/or digital signatures verified using that certificate. In this document, the terms “certificate user” and “relying party” are used interchangeably.

Subject certification authority (subject CA) - In the context of a particular CA-certificate, the subject CA is the CA whose public key is certified in the certificate.

IPR - Intellectual Property Rights

## **2 PUBLICATION AND REPOSITORY RESPONSIBILITIES**

### **2.1 Repositories**

The NCSA PKI will maintain a repository at <http://security.ncsa.illinois.edu/CA/>.

### **2.2 Publication of certification information**

This repository will contain:

- Self-signed, PEM-formatted certificates for all CAs in the NCSA PKI
- PEM-formatted CRLs for the NCSA-CA
- General information about the NCSA PKI, including postal address and contact email address
- The most recent copies of all Certificate Policies for the NCSA PKI CAs, including this policy

### **2.3 Time or frequency of publication**

The CRL will be published immediately after a certificate has been revoked as well as on a daily basis. The CRL This Update field will indicate the issue date of the CRL, and the Next Update field will be set to two weeks in the future, to indicate a two week validity period for the CRL.

The Policy shall be published immediately following any update.

## **2.4 Access controls on repositories**

Access to the repository for modification is restricted to NCSA operations staff, NCSA security operations staff, and NCSA system administration staff. See Section 5.2 for procedural controls regarding NCSA-CA systems.

Read access to the repository (via HTTP) is unrestricted. Repositories are publicly available for read access. Best effort will be provided to maintain their availability 24x7.

As a member of the TAGPMA, NCSA grants the IGTF and its PMAs the right of unlimited redistribution of this information.

# **3 IDENTIFICATION AND AUTHENTICATION**

## **3.1 Naming**

### **3.1.1 Types of names**

Subject distinguished names are X.500 names, with components varying depending on the type of certificate.

### **3.1.2 Need for names to be meaningful**

A unique (see Section 3.1.5) “common name” is assigned to each user consisting of their legal name with a serial number appended in the case of name conflicts.

The CN component of the subject name in service certificates includes the fully qualified DNS name of the service, which is usually that of the host supporting the service. The structure of a service’s CN is designed to support SSL, TLS and Globus services.

### **3.1.3 Anonymity or pseudonymity of subscribers**

Anonymity and pseudonymity are not supported.

### **3.1.4 Rules for interpreting various name forms**

All subject distinguished names in certificates issued by the NCSA PKI begin with C=US, O=National Center for Supercomputing Applications. The next component will be one of:

- OU=Certificate Authorities : for a CA’s certificate. A CN component will follow the OU, naming the CA. All CA certificates will be self-signed.

The distinguished name for the NCSA-CA is C=US, O=National Center for Supercomputing Applications, OU=Certificate Authorities, CN=CACL.

Note: CACL is the name of the software implementing this CA.

- **OU=Services** : for a service (including a host) certificate issued by the NCSA-CA. A CN component will follow the OU, naming the service and the fully qualified domain name (FQDN) at which the service can be contacted, separated by a slash character. When the service is https, the service name and separator will be absent. For example:

C=US, O=National Center for Supercomputing Applications, OU=Services, CN=ca.ncsa.uiuc.edu

- **OU=People** : for a user's certificate issued by the NCSA-CA. A CN component will follow the OU, containing the user's full name and, if needed, a numeric value to disambiguate the name from other users with the same name. For example:

C=US, O=National Center for Supercomputing Applications, OU=People, CN=James J. Barlow

### **3.1.5 Uniqueness of names**

Each subject name issued by the NCSA PKI will be issued to one and only one individual as identified by a record in the user database. The user database management system implements checks to ensure the uniqueness of assigned distinguished names. User records are never purged from the database or reused, to ensure that distinguished names will never be reassigned to another individual. The NCSA PKI may issue certificates with identical names, but only to the same individual. All names will be prefixed with the relative DN form of C=US, O=National Center for Supercomputing Applications to provide a globally unique namespace. A unique "common name" is assigned to each user consisting of their legal name with a serial number appended in the case of name conflicts. This common name along with the prefix create globally-unique distinguished names used in certificates issued by the NCSA PKI to users. For service certificates, the combination of service name and fully qualified domain name of the host on which the service resides serves to disambiguate the name.

### **3.1.6 Recognition, authentication, and role of trademarks**

No stipulation.

## **3.2 Initial identity validation**

### **3.2.1 Method to prove possession of private key**

Certificate requests must be digitally signed by the private key associated with the public key in the request using a process that is run by the user on the client side of the request.

### **3.2.2 Authentication of organization identity**

NCSA users are identified by their presence in the NCSA user database. Users obtain entries in the database according to the procedure described in Section 4.1.2.

### **3.2.3 Authentication of individual identity**

User identity will be authenticated via Kerberos, with the authenticated Kerberos principal name mapped to a unique "common name" via the NCSA user database. The NCSA-CA also uses the database to authenticate users' "default passwords" as a "second authentication factor" as described in Section 1.3.2.

### **3.2.4 Non-verified subscriber information**

No stipulation.

### **3.2.5 Validation of authority**

Users making requests for user certificates must be authenticated as the user identified in the certificate.

Requests for service certificates must come from a valid NCSA User and will be checked against NCSA's database of registered system administrators to ensure the user is a legitimate system administrator for the service identified in the certificate subject name.

### **3.2.6 Criteria for interoperation**

The NCSA PKI is intended to interoperate with other CAs within TeraGrid and the International Grid Trust Federation.

## **3.3 Identification and authentication for re-key requests**

### **3.3.1 Identification and authentication for routine re-key**

Every certificate request is treated as an initial registration.

### **3.3.2 Identification and authentication for re-key after revocation**

If the compromise was limited to just the private key, the request for re-key will be treated as an initial registration. If the compromise involved a user's password, that password will be reset according to Section 4.1.2.

## **3.4 Identification and authentication for revocation request**

CA Certificates will only be revoked at the instigation of NCSA Operational Security personnel.

Users may request revocation by contacting NCSA Security Operations.

Requests for revocation of service certificates from NCSA computer security personnel and from administrators of the systems hosting the services in question will be honored.

Others may request revocation if they can sufficient prove compromise or exposure of the associated private key.

NCSA Security Operations will verify the authenticity of revocation requests by checking digital signatures on the request or by telephone to the requester's registered phone number.

## 4 CERTIFICATE LIFE-CYCLE OPERATIONAL REQUIREMENTS

### 4.1 Certificate Application

#### 4.1.1 Who can submit a certificate application

Any user who appears in NCSA's User Database may request a certificate.

#### 4.1.2 Enrollment process and responsibilities

NCSA allocations group staff serve as registration authorities for the NCSA-CA. They enroll users in the NCSA user database according to the following enrollment process. Additional details are available at <http://www.ncsa.illinois.edu/UserInfo/Allocations/>.

To receive an entry in NCSA's user database, a user must satisfy one of the following conditions:

- Be an NCSA employee
- Have a guest account requested by NCSA management for key NCSA collaborators
- Be a Principal Investigator (PI) with a allocation on NCSA computational resources approved through an NSF-approved peer review process
- Have a project account requested on their behalf by an existing PI using that PI's allocation

Identity vetting of NCSA employees is performed in person as part of the University of Illinois hiring process, in collaboration with the NCSA Human Resources department. Identity vetting of guest accounts requires direct personal contact of an NCSA staff member, who takes responsibility for that person's account. Guest account requests are reviewed and approved by NCSA management and allocations group staff.

Identity vetting for PIs is performed via peer review. PIs submit proposals for supercomputing allocations to a Resource Allocations Committee, which consists of volunteers selected from the faculty and staff of U.S. universities, laboratories and other research institutions. All members serve a term of 2–5 years and have expertise in computational science or engineering. Each proposal is assigned to two committee members for review. The committee members can also solicit an external review. After several weeks of review, the entire committee convenes to discuss the relative merits of each proposal and award time based on availability of resources. To apply, the principal investigator (PI) must be a researcher or educator at a U.S. academic or non-profit research institution.

Proposals are judged on the following criteria:

- Scientific merit: sound scientific goals and approaches of high merit; timely problems of interest to researchers and scientists
- Potential for progress: a PI with a verifiable record of success, indicated by publications or other measures, with the necessary resources to conduct the proposed research
- Numerical approach: codes that employ correct and efficient numerical algorithms; a selection of temporal/spatial resolution that is appropriate for the research

- Justification for resources: an appropriate amount of time has been requested; proposed research requires the use of a supercomputer; applications have been optimized to achieve high single-processor and parallel performance; good scaling of applications on a parallel machine

Allocations are typically awarded for one year, though multi-year allocations may be granted for well-known PIs. PIs can submit renewal or supplemental proposals to the committee to extend their allocation.

PIs are instructed not to share their accounts with others. Instead, they use the Add User Form on the TeraGrid User Portal to request accounts for their project members. PIs can also use this form to remove project members. Access to this form requires authentication via Kerberos username and password. PIs submit name, telephone, and address information for the users on their project. For users on multiple projects, each project PI must complete the required information separately for each user to request the user to have access to the project's resources. The PI is notified by postal mail whenever a user is added to their project. All users are required to sign the TeraGrid User Responsibility Form, which educates users about secure and appropriate computing practices.

When a user no longer has any active projects, the user's Kerberos account is removed. User database entries are kept indefinitely for historical purposes.

All initial user passwords are distributed by postal/campus mail (or in the case of new NCSA employees, in person by the employee's manager). The letter distributed with the initial password instructs the user to change their password and store the letter in a secure place. If the user forgets their password, they can call the helpdesk and request that it be reset to the initial value. If the user has lost the letter with the initial password, they can call the helpdesk and request that a new letter be sent to their address on record.

Each user is assigned a unique username used as their Kerberos principal and Unix login name as described in 3.1.5.

## **4.2 Certificate application processing**

### **4.2.1 Performing identification and authentication functions**

The NCSA-CA authenticates all certificate requests as described in Section 3.2.3.

### **4.2.2 Approval or rejection of certificate applications**

Certificate applications will be approved if the applicant can be authenticated and, in the case of service certificates, is validated as an authorized system administrator for the host in question, as described in Section 3.2.3.

### **4.2.3 Time to process certificate applications**

Certificate applications are processed automatically. Approved applications result in automatic certificate issuance. Non-approved applications are automatically rejected and logged.



## **4.3 Certificate issuance**

### **4.3.1 CA actions during certificate issuance**

Certificate applications are processed automatically. Approved applications result in automatic certificate issuance. Non-approved applications are automatically rejected and logged.

### **4.3.2 Notification to subscriber by the CA of issuance of certificate**

User certificates are returned directly to the user through the application program they use to apply for a certificate.

## **4.4 Certificate acceptance**

### **4.4.1 Conduct constituting certificate acceptance**

Certificate acceptance is assumed.

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

End entity certificates are not published.

### **4.4.3 Notification of certificate issuance by the CA to other entities**

No notifications to other entities will be performed.

## **4.5 Key pair and certificate usage**

### **4.5.1 Subscriber private key and certificate usage**

Subscribers must:

- Exercise all reasonable care in protecting the private keys corresponding to their certificates, including but not limited to never storing them on a networked file system or otherwise transmitting them over a network and never sharing them between people.
- Ensure that the private keys corresponding to their issued service certificates are stored in a manner that minimizes the risk of exposure.
- Observe restrictions on private key and certificate use.
- Promptly notify the CA operators of any incident involving a possibility of exposure of a private key.

Subscribers are notified of these responsibilities in both CA documentation and in the NCSA Acceptable Usage Policy (AUP). Subscribers are required to sign the NCSA AUP and return it to NCSA Allocations.

#### **4.5.2 Relying party public key and certificate usage**

Relying parties should:

- Be cognizant of the provisions of this document.
- Verify any self-signed CA certificates to their own satisfaction using out-of-band means.
- Accept responsibility for checking any relevant CRLs before accepting the validity of a certificate.
- Observe restrictions on private key and certificate use.
- Not presume any authorization of an end entity based on possession of a certificate from the NCSA PKI or its corresponding private key.

### **4.6 Certificate renewal**

Certificates in the NCSA PKI are not renewed. Instead the original subscriber may request a new certificate, using the normal certificate issuance process.

#### **4.6.1 Circumstance for certificate renewal**

No stipulation.

#### **4.6.2 Who may request renewal**

No stipulation.

#### **4.6.3 Processing certificate renewal requests**

No stipulation.

#### **4.6.4 Notification of new certificate issuance to subscriber**

No stipulation.

#### **4.6.5 Conduct constituting acceptance of a renewal certificate**

No stipulation.

#### **4.6.6 Publication of the renewal certificate by the CA**

No stipulation.

#### **4.6.7 Notification of certificate issuance by the CA to other entities**

No stipulation.

### **4.7 Certificate re-key**

Certificates in the NCSA PKI are not re-keyed. Instead the original subscriber may request a new certificate, using the normal certificate issuance process.

#### **4.7.1 Circumstance for certificate re-key**

No stipulation.

#### **4.7.2 Who may request certification of a new public key**

No stipulation.

#### **4.7.3 Processing certificate re-keying requests**

No stipulation.

#### **4.7.4 Notification of new certificate issuance to subscriber**

No stipulation.

#### **4.7.5 Conduct constituting acceptance of a re-keyed certificate**

No stipulation.

#### **4.7.6 Publication of the re-keyed certificate by the CA**

No stipulation.

#### **4.7.7 Notification of certificate issuance by the CA to other entities**

No stipulation.

### **4.8 Certificate modification**

Certificates in the NCSA PKI are not modified. Instead new certificates will be issued using the normal certificate issuance process.

#### **4.8.1 Circumstance for certificate modification**

No stipulation.

#### **4.8.2 Who may request certificate modification**

No stipulation.

#### **4.8.3 Processing certificate modification requests**

No stipulation.

#### **4.8.4 Notification of new certificate issuance to subscriber**

No stipulation.

#### **4.8.5 Conduct constituting acceptance of modified certificate**

No stipulation.

#### **4.8.6 Publication of the modified certificate by the CA**

No stipulation.

#### **4.8.7 Notification of certificate issuance by the CA to other entities**

No stipulation.

## **4.9 Certificate revocation and suspension**

### **4.9.1 Circumstances for revocation**

Certificates issued by the NCSA-CA will be revoked in any of the following circumstances:

- The private key is suspected or reported to be lost or exposed.
- The information in the certificate is believed to be, or has become inaccurate.
- The certificate is reported to no longer be needed.

### **4.9.2 Who can request revocation**

NCSA Security Operations personnel may request revocation of any certificate issued by the NCSA-CA.

The original subscriber for a certificate may request its revocation.

Entities other than the subscriber who suspect a certificate issued by the NCSA PKI may be compromised should contact NCSA Security Operations.

### **4.9.3 Procedure for revocation request**

Requests for revocation should be made by email to [security@ncsa.illinois.edu](mailto:security@ncsa.illinois.edu) or by phone to NCSA Operations 217-244-0710. Requests will be authenticated according to Section 3.4.

### **4.9.4 Revocation request grace period**

No constraints.

### **4.9.5 Time within which CA must process the revocation request**

Revocation requests will be processed within one working day of the request being received.

### **4.9.6 Revocation checking requirement for relying parties**

Relying parties are advised to obtain and consult a valid CRL from <http://security.ncsa.illinois.edu/CA/>

### **4.9.7 CRL issuance frequency (if applicable)**

CRLs are issued when a certificate is revoked.

CRLs are issued daily.

**4.9.8 Maximum latency for CRLs (if applicable)**

One day.

**4.9.9 On-line revocation/status checking availability**

Aside from the published CRL, no on-line certificate status checking is available.

**4.9.10 On-line revocation checking requirements**

None.

**4.9.11 Other forms of revocation advertisements available**

None.

**4.9.12 Special requirements re key compromise**

None.

**4.9.13 Circumstances for suspension**

No stipulation.

**4.9.14 Who can request suspension**

No stipulation.

**4.9.15 Procedure for suspension request**

No stipulation.

**4.9.16 Limits on suspension period**

No stipulation.

## **4.10 Certificate status services**

Aside from the published CRL, no on-line certificate status checking is available.

### **4.10.1 Operational characteristics**

No stipulation.

### **4.10.2 Service availability**

No stipulation.

### **4.10.3 Optional features**

No stipulation.

## **4.11 End of subscription**

Subscribers may end their subscription by requesting revocation of their certificate.

## **4.12 Key escrow and recovery**

No key escrow is performed.

### **4.12.1 Key escrow and recovery policy and practices**

No stipulation.

### **4.12.2 Session key encapsulation and recovery policy and practices**

No stipulation.

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

### **5.1 Physical controls**

#### **5.1.1 Site location and construction**

The NCSA-CA server is located in NCSA's machine room in the Advanced Computation Building (ACB) on the University of Illinois at Urbana-Champaign campus at 1011 West Springfield Avenue in Urbana, Illinois.

#### **5.1.2 Physical access**

NCSA occupies all of ACB with the exception of space dedicated to mechanical systems and custodians. ACB entrances and computer rooms are locked at all times and use a keycard system to gain entry. Video cameras are located at all entrances and are monitored by staff in the control room. An intercom and remote lock release system is used at the main entrance to allow entry to authorized personnel who do not have keycard access. ACB is not open to the general public and is staffed 24x7x365.

#### **5.1.3 Power and air conditioning**

No stipulation.

#### **5.1.4 Water exposures**

No stipulation.

#### **5.1.5 Fire prevention and protection**

No stipulation.

#### **5.1.6 Media storage**

No stipulation.

#### **5.1.7 Waste disposal**

No stipulation.



### **5.1.8 Off-site backup**

Audit logs are archived weekly to a secondary storage facility in the NCSA Building on the University of Illinois at Urbana-Champaign campus at 1205 West Clark Street in Urbana, Illinois. The NCSA Building is approximately 0.4 miles away from ACB, where the CA is located.

## **5.2 Procedural controls**

All persons with access to the systems hosting the NCSA-CA will be full-time NCSA employees. Personnel will be NCSA Operations staff, NCSA Security Operations staff, and NCSA System administration staff.

When any person with access to the NCSA-CA systems leaves NCSA or their administrative role, their access will be revoked and any relevant passwords changed.

NCSA will perform an operational audit of the CA/RA staff at least once per year. A list of CA and site identity management personnel will be maintained and verified at least once per year.

### **5.2.1 Trusted roles**

No stipulation.

### **5.2.2 Number of persons required per task**

No stipulation.

### **5.2.3 Identification and authentication for each role**

No stipulation.

### **5.2.4 Roles requiring separation of duties**

No stipulation.

## **5.3 Personnel controls**

Operators of the NCSA-CA will be qualified system administrators and operators at NCSA.

### **5.3.1 Qualifications, experience, and clearance requirements**

No stipulation.

### **5.3.2 Background check procedures**

No stipulation.

### **5.3.3 Training requirements**

No stipulation.

### **5.3.4 Retraining frequency and requirements**

No stipulation.

### **5.3.5 Job rotation frequency and sequence**

No stipulation.

### **5.3.6 Sanctions for unauthorized actions**

No stipulation.

### **5.3.7 Independent contractor requirements**

No stipulation.

### **5.3.8 Documentation supplied to personnel**

No stipulation.

## **5.4 Audit logging procedures**

### **5.4.1 Types of events recorded**

The following items will be logged and archived:

- Certificate requests
- Certificate issuance
- Certificate revocations
- Issued CRLs

- Attempted and successful accesses to the systems hosting the NCSA PKI, and reboots of those systems

The NCSA user database maintains contact information for all subscribers.

#### **5.4.2 Frequency of processing log**

See Section 5.1.8.

#### **5.4.3 Retention period for audit log**

Audit logs are maintain for at least three years.

#### **5.4.4 Protection of audit log**

Events are recorded in real-time via syslog to the local system and to NCSA's central syslog collector service, which provides an independent, protected log collection point that is physically and logically separated from CA systems. Access to the syslog collector service is restricted to NCSA security operations staff.

#### **5.4.5 Audit log backup procedures**

See Section 5.1.8.

#### **5.4.6 Audit collection system (internal vs. external)**

Audit logs are stored on the local system, on NCSA's central syslog collector service, and in off-site backups (see Section 5.1.8). In all cases the logs are maintained on NCSA systems, in NCSA buildings, under control of NCSA staff.

#### **5.4.7 Notification to event-causing subject**

No stipulation.

#### **5.4.8 Vulnerability assessments**

No stipulation.

### **5.5 Records archival**

The CA records and archives all requests for certificates, all issued certificates, all revocation requests, all issued CRLs, and the login/logout/reboot of the issuing machine. The CA keeps these records for at least three years. These records

will be made available to external auditors in the course of their work as auditor.

#### **5.5.1 Types of records archived**

No stipulation.

#### **5.5.2 Retention period for archive**

No stipulation.

#### **5.5.3 Protection of archive**

No stipulation.

#### **5.5.4 Archive backup procedures**

No stipulation.

#### **5.5.5 Requirements for time-stamping of records**

No stipulation.

#### **5.5.6 Archive collection system (internal or external)**

No stipulation.

#### **5.5.7 Procedures to obtain and verify archive information**

No stipulation.

### **5.6 Key changeover**

Best effort will be made to notify relying parties of any new public key for the NCSA-CA, and it may then be obtained in the same manner as the previous NCSA-CA certificates.

## **5.7 Compromise and disaster recovery**

### **5.7.1 Incident and compromise handling procedures**

All incidents will be handled by NCSA Security Operations and Incident Response as they determine appropriate.

### **5.7.2 Computing resources, software, and/or data are corrupted**

No stipulation.

### **5.7.3 Entity private key compromise procedures**

Any private key compromise will result in revocation of the associated certificate.

### **5.7.4 Business continuity capabilities after a disaster**

No stipulation.

## **5.8 CA or RA termination**

No stipulation.

# **6 TECHNICAL SECURITY CONTROLS**

## **6.1 Key pair generation and installation**

### **6.1.1 Key pair generation**

The NCSA-CA does not generate any private keys but its own.

User private keys will be generated by client software on the host where they will be stored. They will be stored on non-networked filesystems.

System and service administrators will generate private keys for their services, on the service hosts themselves if at all possible.

### **6.1.2 Private key delivery to subscriber**

Not necessary.

### **6.1.3 Public key delivery to certificate issuer**

Public keys are delivered under Kerberos authentication and integrity protection.

### **6.1.4 CA public key delivery to relying parties**

The public keys of NCSA PKI CAs are available at:

- <http://security.ncsa.illinois.edu/CA/>
- <http://security.teragrid.org/TG-CAs.html>
- [http://vdt.cs.wisc.edu/certificate\\_authorities.html](http://vdt.cs.wisc.edu/certificate_authorities.html)
- <https://dist.eugridpma.info/distribution/igtff/>
- <https://www.tacar.org/repos/>

### **6.1.5 Key sizes**

The CA private key will be 2048 bits in length. Public RSA keys shorter than 1024 bits will not be signed.

### **6.1.6 Public key parameters generation and quality checking**

No stipulation.

### **6.1.7 Key usage purposes (as per X.509 v3 key usage field)**

The NCSA-CA does not enforce key usage restrictions by any means beyond the X.509v3 extensions in the certificates it issues. The certificate extensions are specified in Section 7.1.2.

## **6.2 Private Key Protection and Cryptographic Module Engineering Controls**

### **6.2.1 Cryptographic module standards and controls**

The NCSA-CA uses a FIPS 140-2 level 3 Hardware Security Module (SafeNet Luna PCI) for storage of its private key, operated in FIPS 140-2 level 2 mode.

### **6.2.2 Private key (n out of m) multi-person control**

No stipulation.

### **6.2.3 Private key escrow**

NCSA-CA private keys are not escrowed.

### **6.2.4 Private key backup**

NCSA-CA private key is replicated on two identical cryptographic modules on two identical hosts in the NCSA machine room to provide for failure protection. The replication procedure involves transferring the private key from one cryptographic module to the other in an encrypted file. The private key is never exported in plain text form. If a system hosting one CA should fail, that CA will temporarily be hosted on the other system until such time as a replacement system can be arranged.

### **6.2.5 Private key archival**

NCSA-CA private keys are not archived.

### **6.2.6 Private key transfer into or from a cryptographic module**

NCSA-CA private keys will initially be replicated on two identical cryptographic storage modules in a secure manner. After that point they will not be exported from the cryptographic modules. The private key is never exported in plain text form.

### **6.2.7 Private key storage on cryptographic module**

NCSA-CA private keys are stored on cryptographic modules meeting FIPS 140-2 level 3, operated in FIPS 140-2 level 2 mode.

### **6.2.8 Method of activating private key**

The private key is activated automatically at server startup to allow immediate NCSA-CA operation.

### **6.2.9 Method of deactivating private key**

HSM utilities on the server support deactivating the private key.

### **6.2.10 Method of destroying private key**

The HSM Security Officer can reinitialize the HSM to destroy the private key.

### **6.2.11 Cryptographic Module Rating**

The hardware security modules meet FIPS 140-2 level 3.

## **6.3 Other aspects of key pair management**

### **6.3.1 Public key archival**

No stipulation.

### **6.3.2 Certificate operational periods and key pair usage periods**

The certificate for NCSA-CA will have a lifetime of 10 years.

NCSA-CA User and Service certificates will have a lifetime of not more than 1 year and 1 month.

## **6.4 Activation data**

The NCSA-CA private key is activated automatically at boot time.

### **6.4.1 Activation data generation and installation**

Activation data is generated using the operator interface of the SafeNet Luna PCI module and stored on the local CA server filesystem.

### **6.4.2 Activation data protection**

Activation data is readable only by the root account on the local CA server filesystem.

### **6.4.3 Other aspects of activation data**

No stipulation.

## **6.5 Computer security controls**

The NCSA-CA software runs on a dedicated machine, running no other services than those needed for the CA operations. The server's network is protected by a dedicated hardware firewall, and the server itself runs an operating system firewall. The server is monitored via both host-based and network-based intrusion detection systems. Login access is subject to hardware-based one-time password (OTP) authentication using hardware tokens and permitted only for administrative personnel that require access to the system for its operation.



The Kerberos and User Database servers likewise run on dedicated machines, running no other services than those needed for Kerberos and User Database operations, located in NCSA's machine room in the Advanced Computation Building on the University of Illinois campus. The servers are monitored via both host-based and network-based intrusion detection systems, and login access is subject to hardware-based OTP authentication.

#### **6.5.1 Specific computer security technical requirements**

No stipulation.

#### **6.5.2 Computer security rating**

No stipulation.

### **6.6 Life cycle technical controls**

No stipulation.

#### **6.6.1 System development controls**

No stipulation.

#### **6.6.2 Security management controls**

No stipulation.

#### **6.6.3 Life cycle security controls**

No stipulation.

### **6.7 Network security controls**

Network security controls (software and hardware firewalls) allow inbound connections only for certificate requests and download of CA certificates and CRLs from hosts outside NCSA's network.

### **6.8 Time-stamping**

No stipulation.

## 7 CERTIFICATE, CRL, AND OCSP PROFILES

### 7.1 Certificate profile

End-entity certificates will be X509v3, compliant with RFC 5280.

#### 7.1.1 Version number(s)

The version number will have a value of 2 indicating a Version 3 certificate.

#### 7.1.2 Certificate extensions

For the CA certificate:

- keyUsage (critical): Digital Signature, Certificate Sign, CRL Sign
- basicConstraints (critical): CA:true
- X509v3 Subject Key Identifier
- X509v3 Authority Key Identifier
- CRLDistributionPoints: URI:<http://ca.ncsa.uiuc.edu/9b95bbf2.crl>

For user and service certificates:

- Basic Constraints (critical): CA:false
- X509v3 Subject Key Identifier
- X509v3 Authority Key Identifier
- X509v3 Certificate Policies:
  - Policy: 1.3.6.1.4.1.4670.100.1.6 (this document)
  - Policy: 1.2.840.113612.5.2.2.5 (Member Integrated X.509 Credential Services with Secured Infrastructure)
  - Policy: 1.2.840.113612.5.2.3.2.1 (Identity Vetting by a Trusted Third Party)
- Key Usage (critical): Digital Signature, Non Repudiation, Key Encipherment, Data Encipherment
- CRLDistributionPoints: URI:<http://ca.ncsa.uiuc.edu/9b95bbf2.crl>
- SubjectAltName: For user certificates, the NCSA email address of the subscriber responsible for the certificate. For service certificates, the dnsName of the service and the NCSA email address of the responsible system administrator.

### 7.1.3 Algorithm object identifiers

- Hash Functions: sha1 1.3.14.3.2.26, sha256 2.16.840.1.101.3.4.2.1, sha384 2.16.840.1.101.3.4.2.2, sha512 2.16.840.1.101.3.4.2.3
- RSA Encryption: rsaEncryption 1.2.840.113549.1.1.1
- Signature Algorithms: sha1WithRSAEncryption 1.2.840.113549.1.1.5, sha256WithRSAEncryption 1.2.840.113549.1.1.11, sha384WithRSAEncryption 1.2.840.113549.1.1.12, sha512WithRSAEncryption 1.2.840.113549.1.1.13

### 7.1.4 Name forms

All certificates will have one of the following name forms:

- C=US, O=National Center for Supercomputing Applications, OU=Services, CN=**svcname/FQDN**
- C=US, O=National Center for Supercomputing Applications, OU=Services, CN=**FQDN**
- C=US, O=National Center for Supercomputing Applications, OU=People, CN=**user name**
- C=US, O=National Center for Supercomputing Applications, OU=Certificate Authorities, CN=**CA name**

Where:

- **svcname** is “host” or an identifier of the service the certificate is associated with.
- **FQDN** is the fully qualified domain name of the host on which the service the certificate is associated with is homed.
- **user name** is a unique name for the subscriber, which may have appended digits to disambiguate.
- **ca name** is the name of a CA.

### 7.1.5 Name constraints

All certificates issued by the NCSA PKI will have names with the following prefix:

“C=US, O=National Center for Supercomputing Applications”

### 7.1.6 Certificate policy object identifier

1.3.6.1.4.1.4670.100.1.6

### 7.1.7 Usage of Policy Constraints extension

No stipulation.

### **7.1.8 Policy qualifiers syntax and semantics**

No stipulation.

### **7.1.9 Processing semantics for the critical Certificate Policies extension**

No stipulation.

## **7.2 CRL profile**

### **7.2.1 Version number(s)**

The version number will be 1 indicating a version 2 CRL.

### **7.2.2 CRL and CRL entry extensions**

No stipulation.

## **7.3 OCSP profile**

OCSP is not supported.

### **7.3.1 Version number(s)**

No stipulation.

### **7.3.2 OCSP extensions**

No stipulation.

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

NCSA-CA will accept being audited by other IGTF accredited CAs to verify compliance with the rules and procedures specified in this document. NCSA-CA audit records will be made available to external auditors in the course of their work as auditor.

## **8.1 Frequency or circumstances of assessment**

No stipulation.

## **8.2 Identity/qualifications of assessor**

No stipulation.

## **8.3 Assessor's relationship to assessed entity**

No stipulation.

## **8.4 Topics covered by assessment**

No stipulation.

## **8.5 Actions taken as a result of deficiency**

No stipulation.

## **8.6 Communication of results**

Audit results will be made available to the TAGPMA upon request.

# **9 OTHER BUSINESS AND LEGAL MATTERS**

## **9.1 Fees**

No fees will be charged by the NCSA-CA nor any refunds given.

### **9.1.1 Certificate issuance or renewal fees**

No stipulation.

### **9.1.2 Certificate access fees**

No stipulation.

### **9.1.3 Revocation or status information access fees**

No stipulation.

### **9.1.4 Fees for other services**

No stipulation.

### **9.1.5 Refund policy**

No stipulation.

## **9.2 Financial responsibility**

No financial responsibility is accepted.

### **9.2.1 Insurance coverage**

No stipulation.

### **9.2.2 Other assets**

No stipulation.

### **9.2.3 Insurance or warranty coverage for end-entities**

No stipulation.

## **9.3 Confidentiality of business information**

Information and data maintained in electronic media on University of Illinois computer systems are protected by the same laws and policies, and are subject to the same limitations, as information and communications in other media. Before storing or sending confidential or personal information, NCSA-CA users should understand that most materials on University systems are, by definition, public records. As such, they are subject to laws and policies that may compel the University to disclose them. The privacy of materials kept in electronic data storage and electronic mail is neither a right nor is it guaranteed.

### **9.3.1 Scope of confidential information**

No stipulation.

### **9.3.2 Information not within the scope of confidential information**

No stipulation.

### **9.3.3 Responsibility to protect confidential information**

No stipulation.

## **9.4 Privacy of personal information**

The privacy of personal information collected by the NCSA-CA is neither a right nor is it guaranteed. See Section 9.3.

### **9.4.1 Privacy plan**

The NCSA-CA does not have a specific privacy plan other than implementing the privacy policies applied to all University of Illinois computer systems.

### **9.4.2 Information treated as private**

No stipulation.

### **9.4.3 Information not deemed private**

No stipulation.

### **9.4.4 Responsibility to protect private information**

No stipulation.

### **9.4.5 Notice and consent to use private information**

No stipulation.

#### **9.4.6 Disclosure pursuant to judicial or administrative process**

No stipulation.

#### **9.4.7 Other information disclosure circumstances**

No stipulation.

### **9.5 Intellectual property rights**

The NCSA-CA asserts no ownership rights in certificates issued to subscribers.

Acknowledgment is hereby given to the Fermilab PKI, the DOE Science Grid and to the CERN Certification Authority for inspiration of parts of this document.

### **9.6 Representations and warranties**

The NCSA-CA and its agents make no guarantee about the security or suitability of a service that is identified by a NCSA certificate. The NCSA-CA is run with a reasonable level of security, but it is provided on a best effort only basis. It does not warrant its procedures and it will take no responsibility for problems arising from its operation, or for the use made of the certificates it provides.

#### **9.6.1 CA representations and warranties**

No stipulation.

#### **9.6.2 RA representations and warranties**

No stipulation.

#### **9.6.3 Subscriber representations and warranties**

No stipulation.

#### **9.6.4 Relying party representations and warranties**

No stipulation.



### **9.6.5 Representations and warranties of other participants**

No stipulation.

### **9.7 Disclaimers of warranties**

The NCSA-CA denies any financial or any other kind of responsibility for damages or impairments resulting from its operation.

### **9.8 Limitations of liability**

The NCSA-CA is operated substantially in accordance with NCSA's own risk analysis. No liability, explicit or implicit, is accepted.

### **9.9 Indemnities**

No stipulation.

### **9.10 Term and termination**

#### **9.10.1 Term**

This policy becomes effective on its posting to <http://security.ncsa.illinois.edu/CA/>.

#### **9.10.2 Termination**

This policy may be terminated at any time without warning.

#### **9.10.3 Effect of termination and survival**

No stipulation.

### **9.11 Individual notices and communications with participants**

No stipulation.

## **9.12 Amendments**

### **9.12.1 Procedure for amendment**

Changes to this document will be presented to the TAGPMA for approval before taking effect.

Changes will go into effect on the publishing of this document to NCSA-CA.

### **9.12.2 Notification mechanism and period**

Best effort notification of all relying parties will be made with as much advance notice as possible.

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

Any substantial change of policy will incur a change of OID.

## **9.13 Dispute resolution provisions**

NCSA Security Operations will resolve all disputes regarding this policy.

## **9.14 Governing law**

Interpretation of this policy is according to the laws of the United States of America and the State of Illinois, where the conforming CA is established.

## **9.15 Compliance with applicable law**

No stipulation.

## **9.16 Miscellaneous provisions**

No stipulation.

### **9.16.1 Entire agreement**

No stipulation.

### **9.16.2 Assignment**

No stipulation.

### **9.16.3 Severability**

No stipulation.

### **9.16.4 Enforcement (attorneys' fees and waiver of rights)**

No stipulation.

### **9.16.5 Force Majeure**

No stipulation.

## **9.17 Other provisions**

No stipulation.

## **10 DOCUMENT SOURCE**

This source for this document can be found in the CVSROOT of `:pserver:anonymous@cvs.ncsa.uiuc.edu:/CVS/ncsa-ca` in the ncsa-cp repository. It is online at:

<http://cvs.ncsa.uiuc.edu/viewcvs.cgi/ncsa-cp/?cvsroot=ncsa-ca>.

The CVS version of the source for this document is *Revision* : 1.38. Changes in the version of this source could be due to minor editorial changes and do not by themselves imply a change of policy.

This document was generated from source on Tue Dec 14 13:11:27 CST 2010 .

## **11 REVISION HISTORY**

This section captures the revision history for the Certificate Policy and Practice Statements of the NCSA PKI. The Certificate Policy and Practice Statements of the CAs in the NCSA PKI share a common source and are versioned in a coordinated fashion, given that changes to policy often affect all the CAs. Not all revisions listed below may pertain to this policy.

1.6 Added SHA-256, SHA-384, and SHA-512 in Section 7.1.3 (algorithm object identifiers) to enable move to SHA-2 hash functions per the NIST Policy on Hash Functions.

1.5 The changes in this version are:

- Updated Section 4.1.2 to allow the new capability in the TeraGrid User Portal for new users to choose their initial passwords during initial registration, rather than distributing initial passwords via postal mail.
- Updated Section 6.3.2 to increase the maximum lifetime of certificates issued by the NCSA-CA to 1 year and 1 month and by the NCSA-SLCS and NCSA-GSCA to 11 days.
- Updated addresses from uiuc.edu to illinois.edu as appropriate. Note that old uiuc.edu addresses will automatically redirect to their new illinois.edu versions. Note also that some services, such as CRL distribution, still use uiuc.edu addresses.

1.4 Introduced the GridShib CA (NCSA-GSCA). Updated off-site backup location (moved from the Beckman Institute to the new NCSA Building). Added IGTF policy OIDs. Replaced RFC 3280 reference with RFC 5280. Updated to strictly conform to RFC 3647 outline. GridShib CA approved by TAGPMA May 2009.

1.3 The SLCS CA now issues CRLs.

1.2 Updated password reset process in Section 4.1.2 to include password resets via the TeraGrid User Portal for the SLCS CA. Approved by TAGPMA April 2008. Began issuing certificates May 2008.

1.1 NCSA-CA and NCSA-SLCS approved by TAGPMA April 2007 and began issuing certificates May 2007.

- Documented allocations process with PIs acting as RAs.
- MICS CA updated to issue user certificates with OU=People.
- MICS CA issues version 2 CRLs.

1.0 Presented at TAGPMA Face-to-Face Meeting in Mexico City (March 2007).