

DNSSEC for the Root Zone

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This design is the result of a cooperation
between ICANN & VeriSign with
support from the U.S. DoC NTIA

Design Requirements Keywords

Transparency

Processes and procedures should be as open as possible for the Internet community to trust the signed root

Audited

Processes and procedures should be audited against industry standards, e.g. ISO/IEC 27002:2005

High Security

Root system should meet all NIST
SP 800-53 technical security controls required
by a HIGH IMPACT system

Roles and Responsibilities

ICANN

IANA Functions Operator

- Manages the Key Signing Key (KSK)
- Accepts DS records from TLD operators
- Verifies and processes request
- Sends update requests to DoC for authorization and to VeriSign for implementation

DoC NTIA

U.S. Department of Commerce

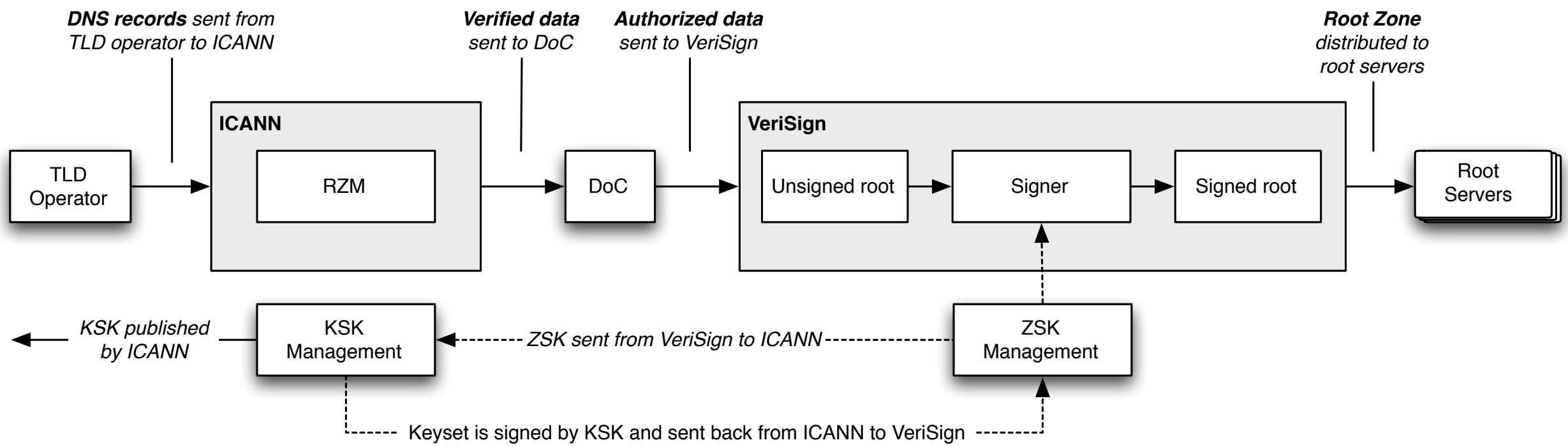
National Telecommunications and Information Administration

- Authorizes changes to the root zone
 - ▶ DS records
 - ▶ Key Signing Keys
 - ▶ DNSSEC update requests follow the same process as other changes
- Checks that ICANN has followed their agreed upon verification/processing policies and procedures

VeriSign

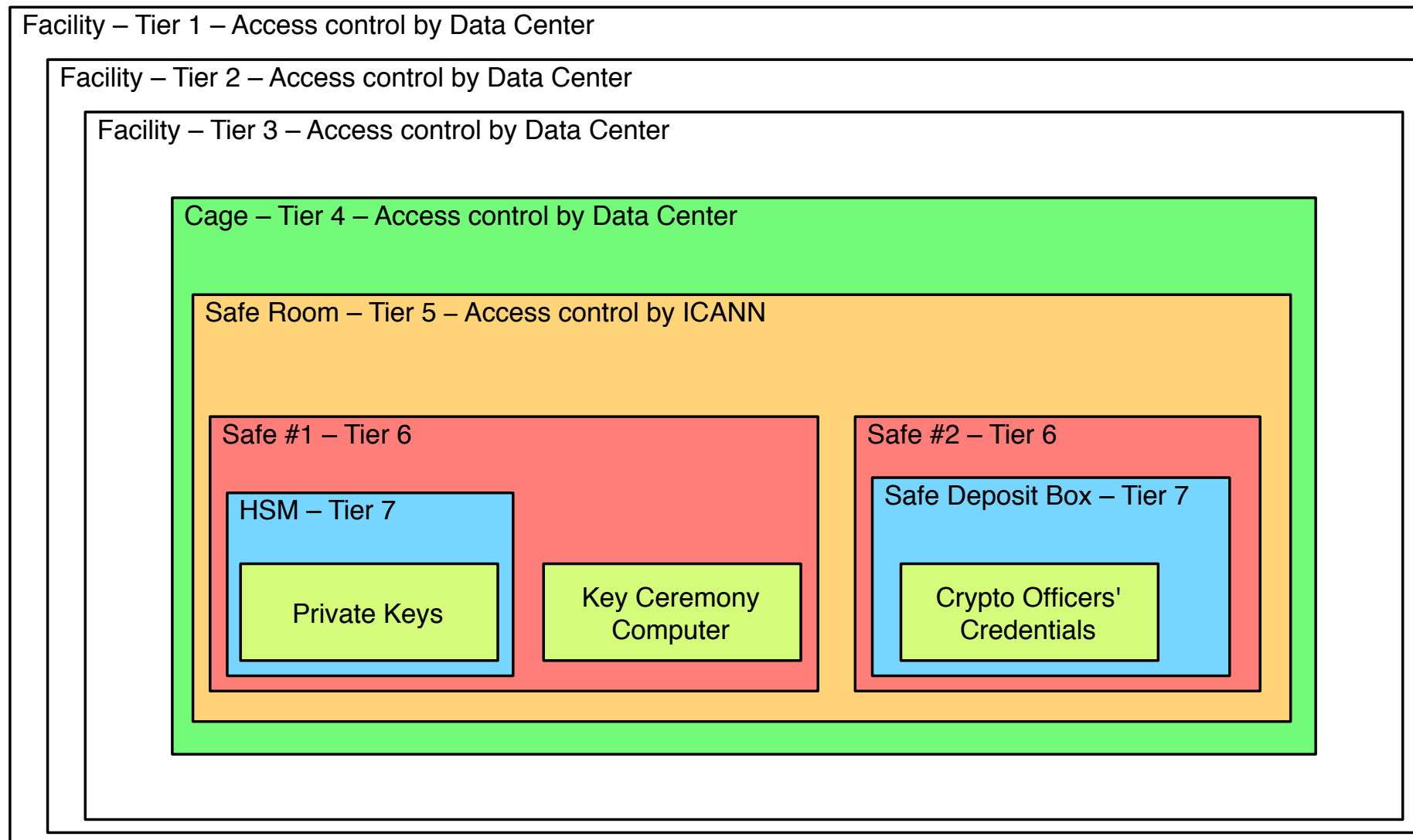
Root Zone Maintainer

- Manages the Zone Signing Key (ZSK)
- Incorporates NTIA-authorized changes
- Signs the root zone with the ZSK
- Distributes the signed zone to the root server operators



Proposed Approach to Protecting the KSK

Physical Security

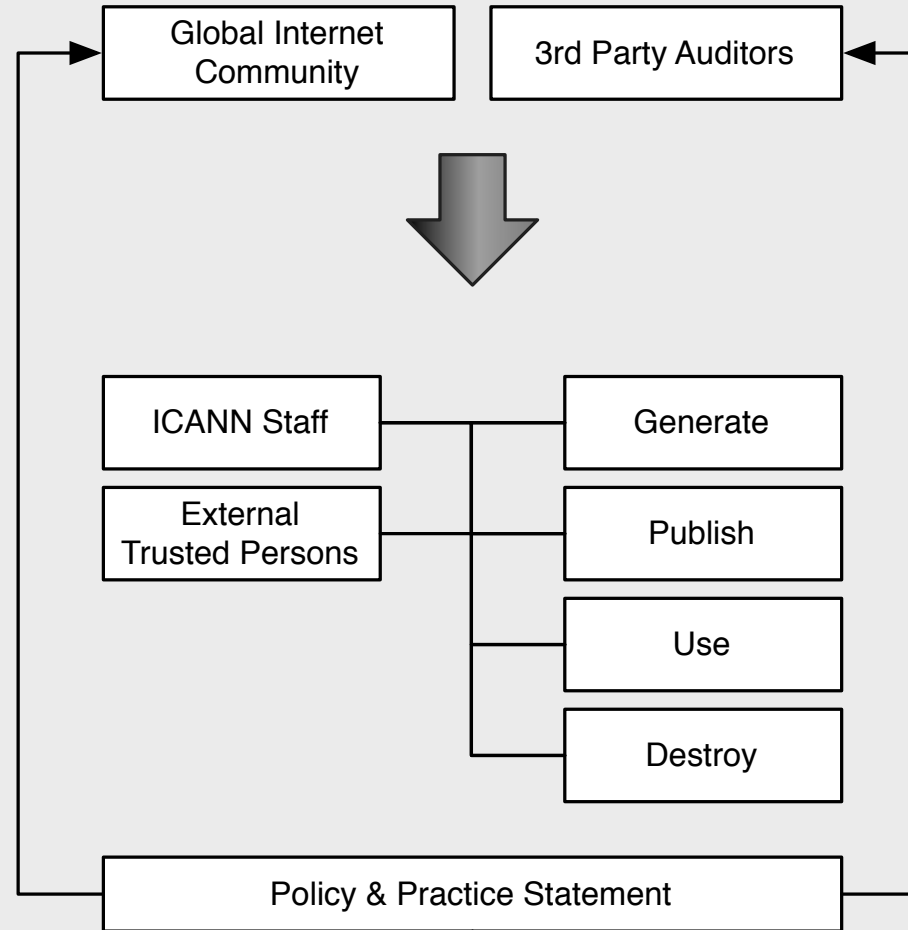


DPS

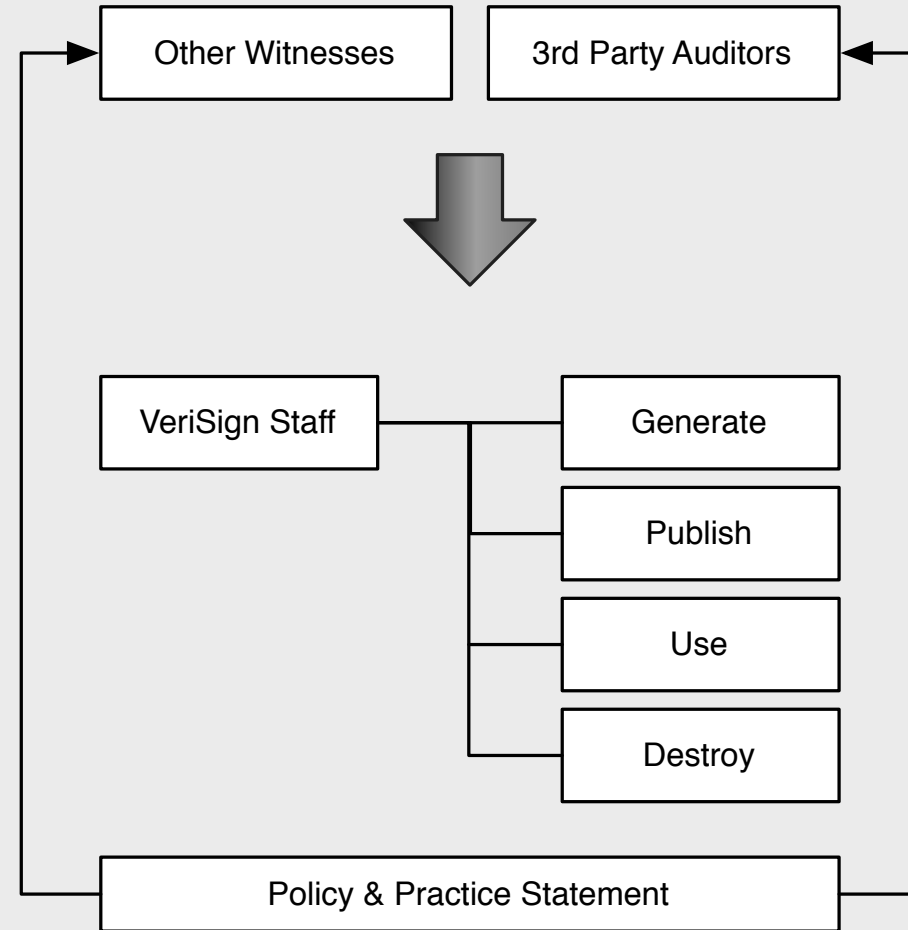
DNSSEC Policy & Practice Statement

- States the practices and provisions that are employed in root zone signing and zone distribution services
 - ▶ Issuing, managing, changing and distributing DNS keys in accordance with the specific requirements of the U.S. DoC NTIA
- Comparable to a certification practice statement (CPS) from an X.509 certificate authority (CA)

Key Signing Key Management



Zone Signing Key Management



Community Trust

- Proposal that community representatives* have an active roll in management of the KSK
 - ▶ as Crypto Officers needed to activate the KSK
 - ▶ as Backup Key Share Holders protecting shares of the symmetric key that encrypts the backup copy of the KSK

*) drawn from members of entities such as ccNSO, GNSO, IAB, RIRs, ISOC

Auditing & Transparency

- Third-party auditors check that ICANN operates as described in the DPS
- Other external witness may also attend the key ceremonies

Proposed DNSSEC Protocol Parameters

Key Signing Key

- KSK is 2048-bit RSA
 - ▶ Rolled every 2-5 years
 - ▶ RFC 5011 for automatic key rollovers
- Propose using signatures based on SHA-256

Zone Signing Key

- ZSK is 1024-bit RSA
 - ▶ Rolled once a quarter (four times per year)
- Zone signed with NSEC
- Propose using signatures based on SHA-256

Signature Validity

- DNSKEY-covering RRSIG validity 15 days
 - ▶ re-sign every 10 days
- Other RRSIG validity 7 days
 - ▶ re-sign twice per day (with zone generation)

Key Ceremonies

- Key Generation
 - ▶ Generation of new KSK
 - ▶ Every 2-5 years
- Processing of ZSK Signing Request (KSR)
 - ▶ Signing ZSK for the next upcoming quarter
 - ▶ Every quarter

Root Trust Anchor

- Published on a web site by ICANN as
 - ▶ XML-wrapped and plain DS record
 - to facilitate automatic processing
 - ▶ PKCS #10 certificate signing request (CSR)
 - as self-signed public key
 - Allows third-party CAs to sign the KSK

Proposed Deployment

Roll Out

- Incremental roll out of the signed root
 - ▶ Groups of root server “letters” at a time
- Watch the query profile to all root servers as roll out progresses
- Listen to community feedback for any problems

No validation

- Real keys will be replaced by dummy keys while rolling out the signed root
 - ▶ Signatures will not validate during roll out
 - ▶ Actual keys will be published at end of roll out

Draft Timeline

- December 1, 2009
 - ▶ **Root zone signed**
 - Initially signed zone stays internal to ICANN and VeriSign
 - ▶ ICANN and VeriSign begin KSR processing
 - ZSK and KSK rolls
- January - July 2010
 - ▶ Incremental roll out of signed root
- July 1, 2010
 - ▶ KSK rolled and trust anchor published
 - ▶ **Signed root fully deployed**

Documentation

- NTIA Requirements and High Level Technical Architecture posted:
 - ▶ <http://www.ntia.doc.gov/dns/dnssec.html>
- Draft DPS för ICANN and VeriSign will be posted in very near future.

Thoughts?

- Feedback on this proposal would be extremely welcome
 - ▶ Queue at the mic
 - ▶ Email to root-dnssec-feedback@verisignlabs.com

Root DNSSEC Design Team

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