Overview of the IANA Functions for the IFRT

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IANA Function Review Team
January 2020

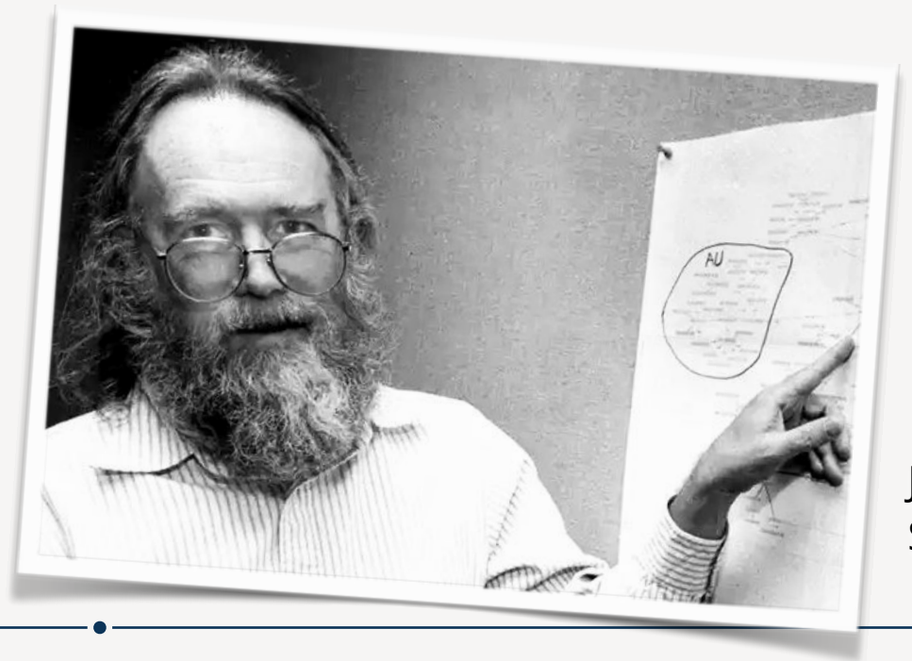
PTI | An ICANN Affiliate

Learning Objectives

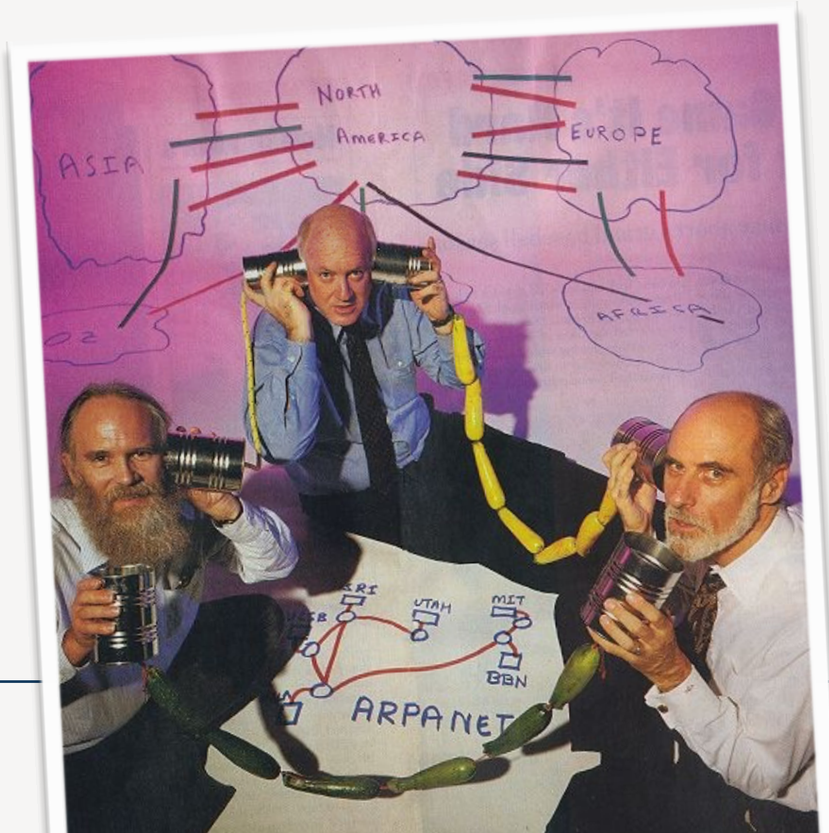
- What is IANA?
- The IANA functions
  - Protocol Parameters
  - Number Resources
  - Naming Functions
    - Root Zone Management
    - Root Zone KSK
    - Other Naming Functions
- Corporate structure
- Accountability mechanisms
- Other potentially useful information

What are the IANA functions?

- The record keeper for the unique names and numbers used by Internet technologies to interoperate
- The IANA functions pre-date ICANN. In 1998, ICANN was established to be the home of the IANA functions
- The unique identifiers include protocol parameters, Internet numbers and domain names
- The IANA team maintains these records according to policies adopted by Internet names, numbers and protocol standards communities

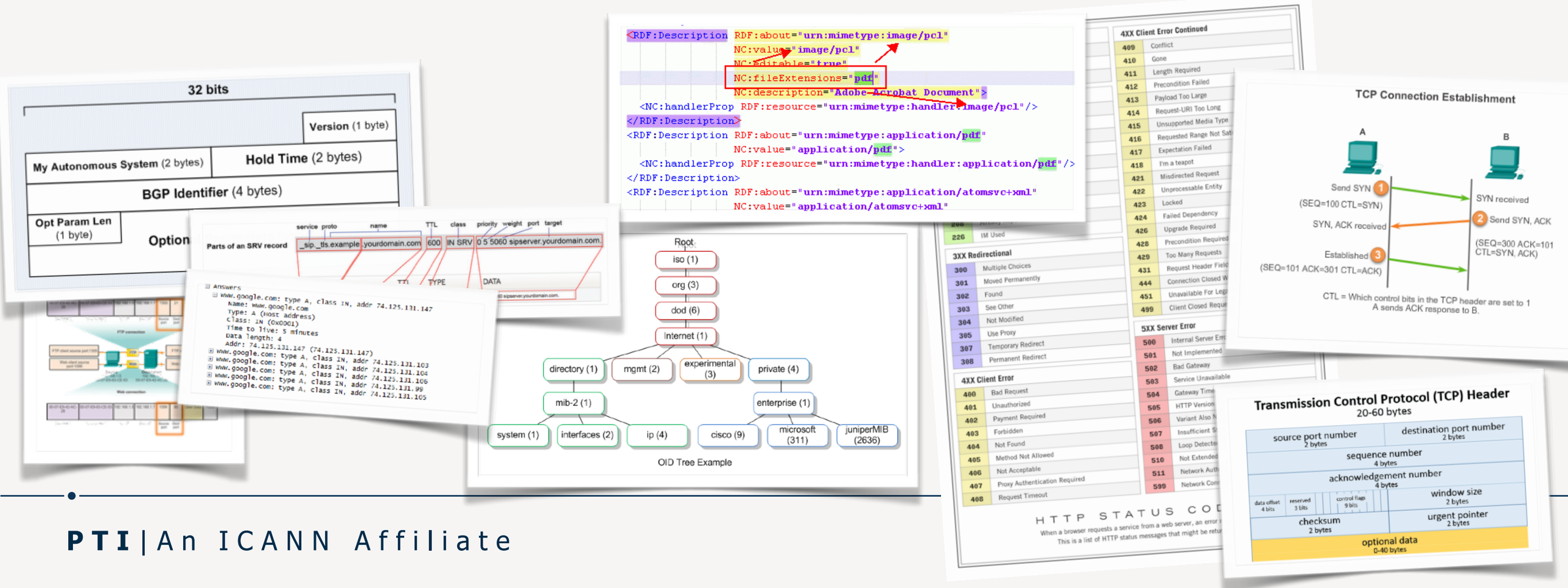


Jon Postel (L) started the IANA; with Steve Crocker and Vint Cerf (R)

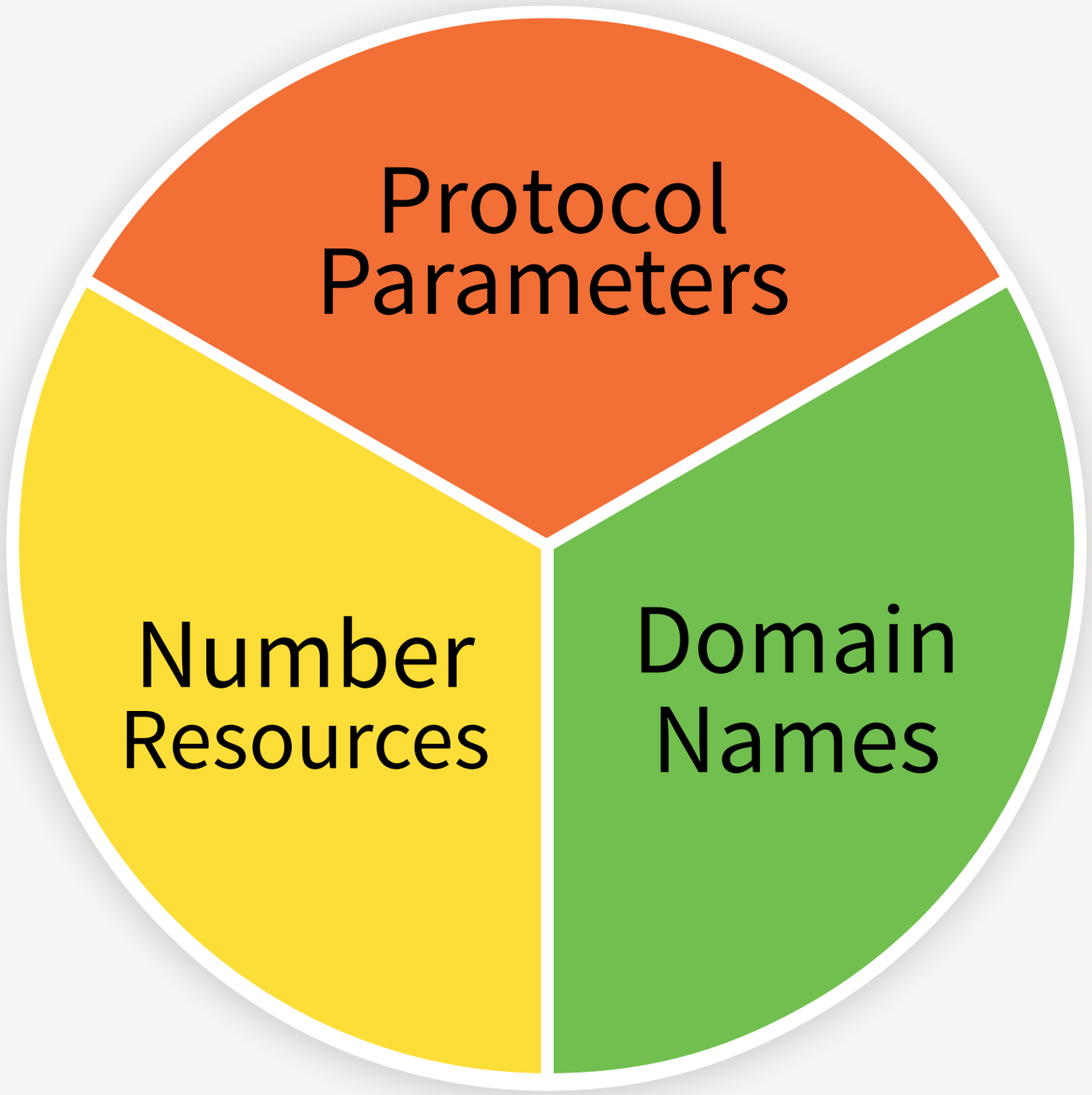


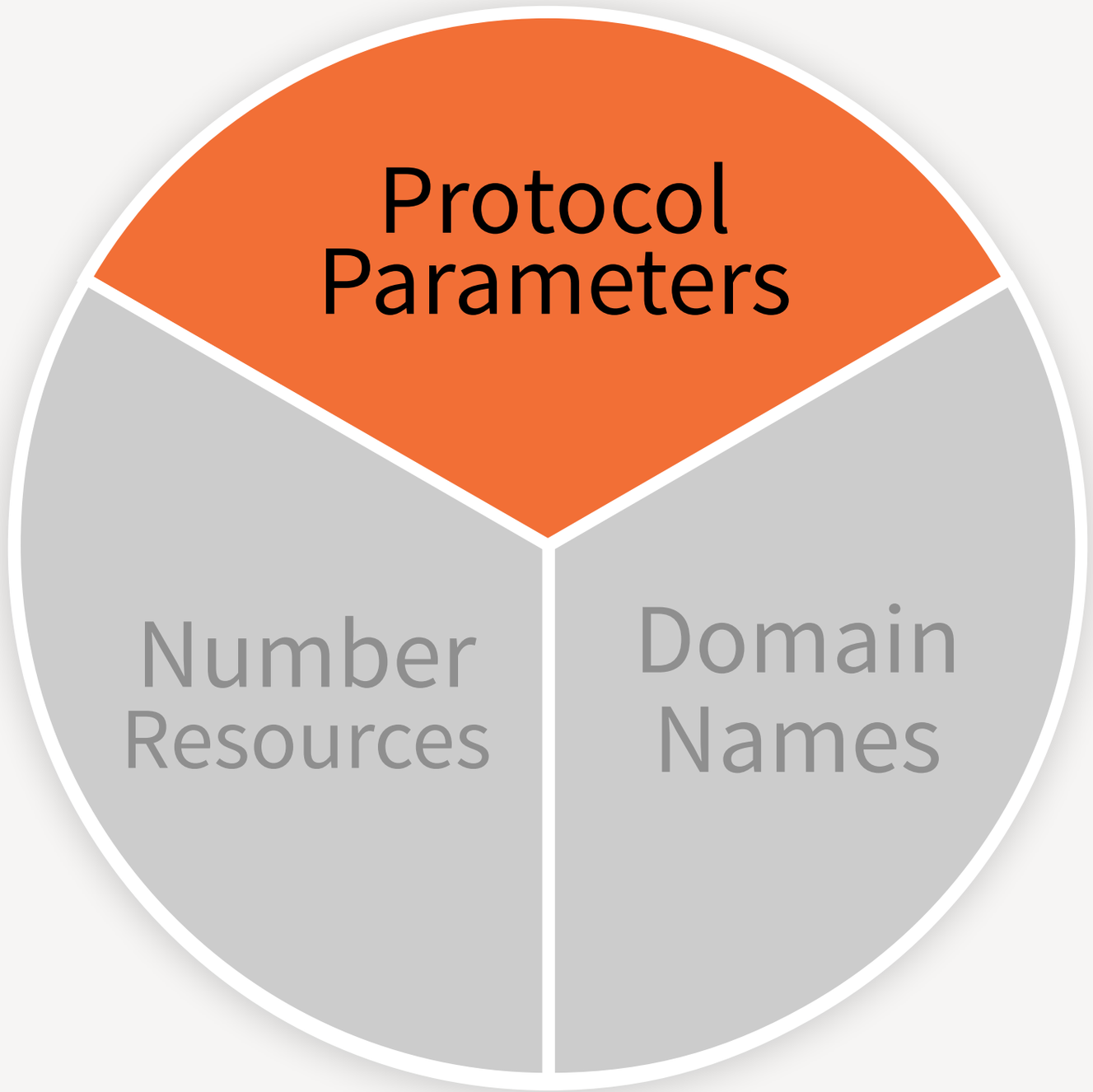
Why do the IANA functions exist?

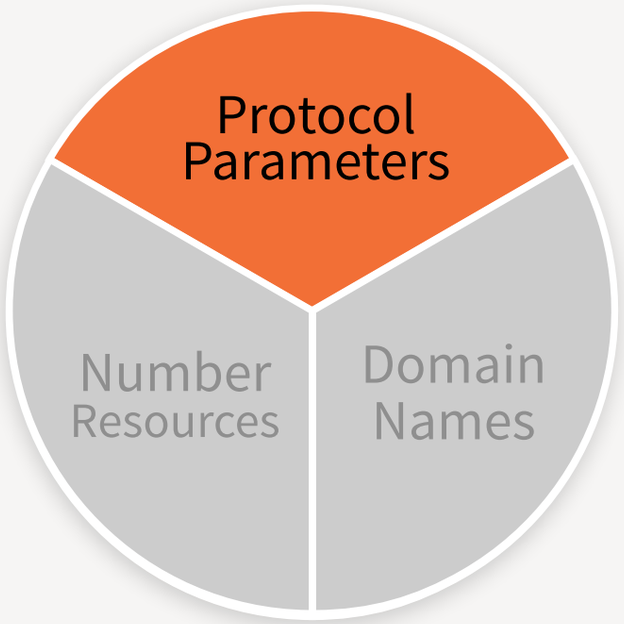
- Coordinating the Internet unique identifier systems is needed to ensure the Internet interoperates globally
- If Internet-connected devices do not use the same system of identifiers and numbers to talk to one another, the system will not interoperate (i.e. speak a common language)
- The authoritative registries are used by vendors, service providers, businesses, application developers and others to innovate and expand the use of the Internet



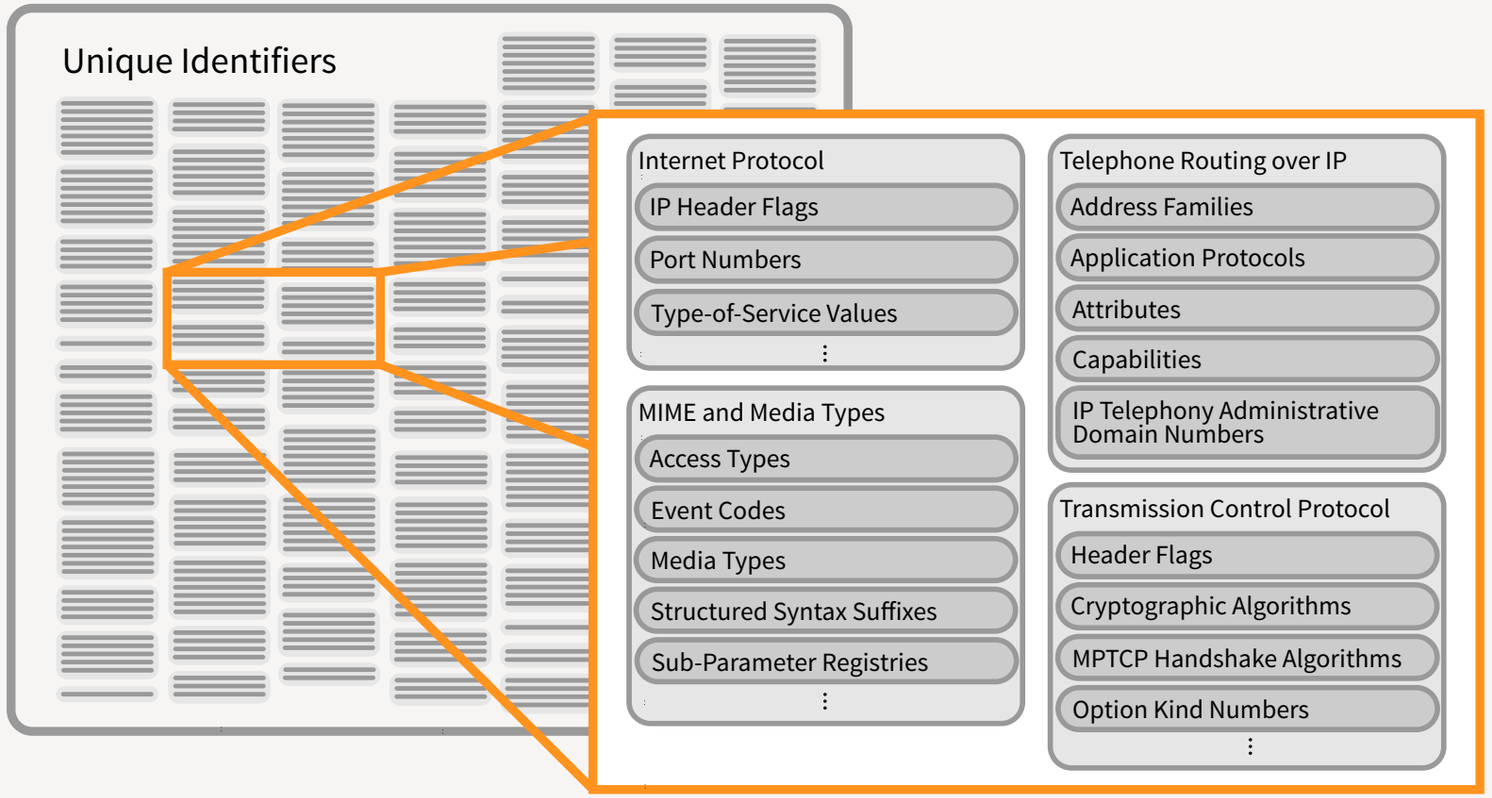
The core IANA functions areas

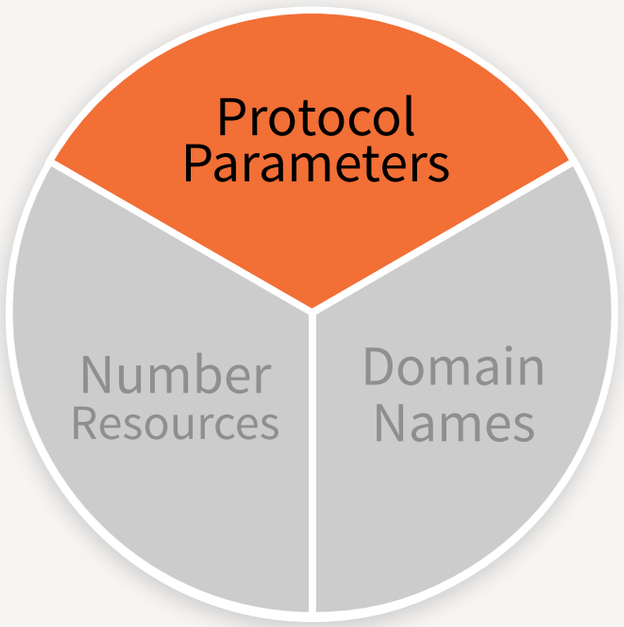



Protocol Parameters
Number Resources
Domain Names

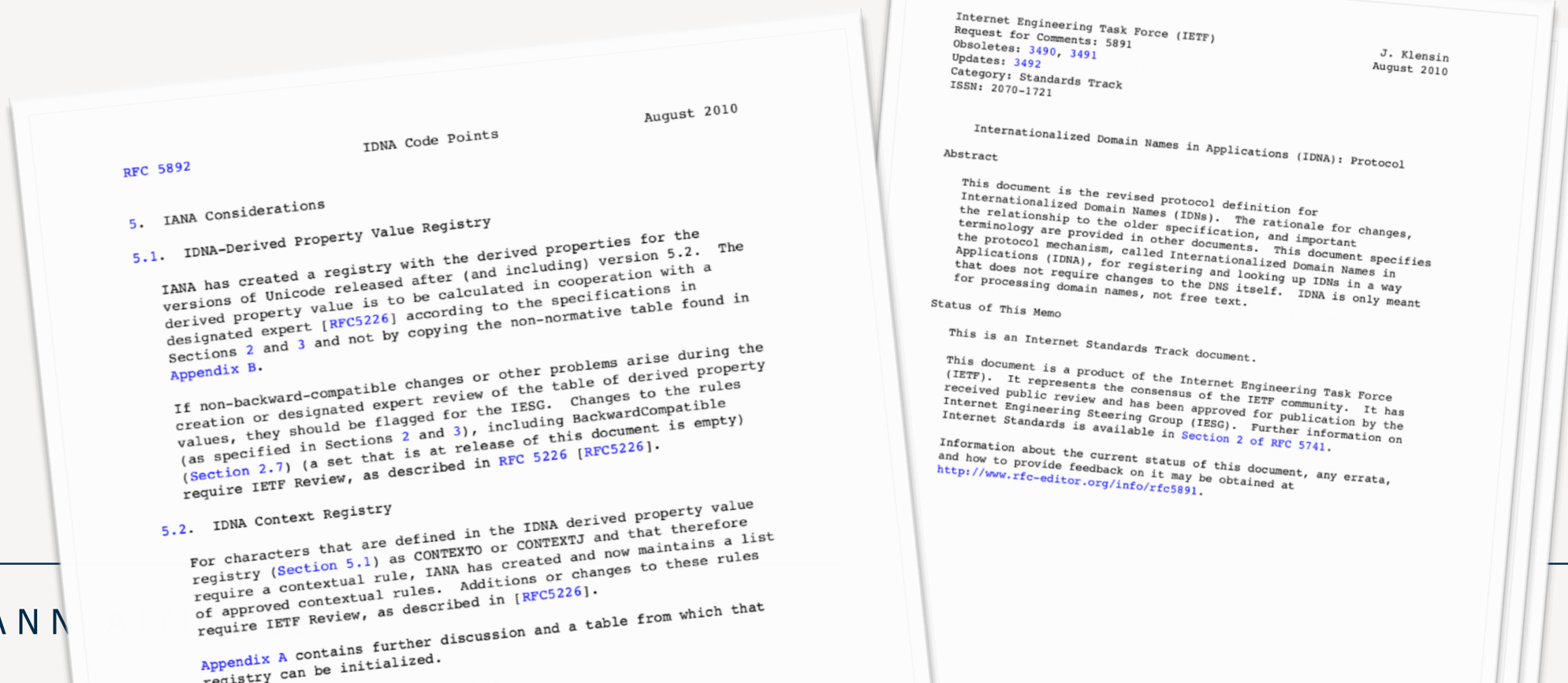


- **Protocol Parameters** are used everywhere and are directly issued by IANA. Rules differ for the qualifying criteria for each type. Applications are evaluated by IANA according to the set criteria.
- Most protocol parameters' visibility is limited to software implementors (i.e. inside software code).





- The **Internet Engineering Task Force** (IETF) develops the Internet standards that define protocol parameter systems. These documents include guidance on unique identifiers that IANA most implement, referred to as “IANA Considerations”:
  - Instructions on the creation of a unique registry for protocol parameters
  - Registration policy
  - Initial registrations and reserved values



RFC 5892 IDNA Code Points August 2010

5. IANA Considerations

5.1. IDNA-Derived Property Value Registry

IANA has created a registry with the derived properties for the versions of Unicode released after (and including) version 5.2. The derived property value is to be calculated in cooperation with a designated expert [RFC5226] according to the specifications in Sections 2 and 3 and not by copying the non-normative table found in Appendix B.

If non-backward-compatible changes or other problems arise during the creation or designated expert review of the table of derived property values, they should be flagged for the IESG. Changes to the rules (as specified in Sections 2 and 3), including BackwardCompatible (Section 2.7) (a set that is at release of this document is empty) require IETF Review, as described in RFC 5226 [RFC5226].

5.2. IDNA Context Registry

For characters that are defined in the IDNA derived property value registry (Section 5.1) as CONTEXTO or CONTEXTJ and that therefore require a contextual rule, IANA has created and now maintains a list of approved contextual rules. Additions or changes to these rules require IETF Review, as described in [RFC5226].

Appendix A contains further discussion and a table from which that registry can be initialized.

Internet Engineering Task Force (IETF)
Request for Comments: 5891
Obsoletes: 3490, 3491
Updates: 3492
Category: Standards Track
ISSN: 2070-1721

J. Klensin
August 2010

Internationalized Domain Names in Applications (IDNA): Protocol

Abstract

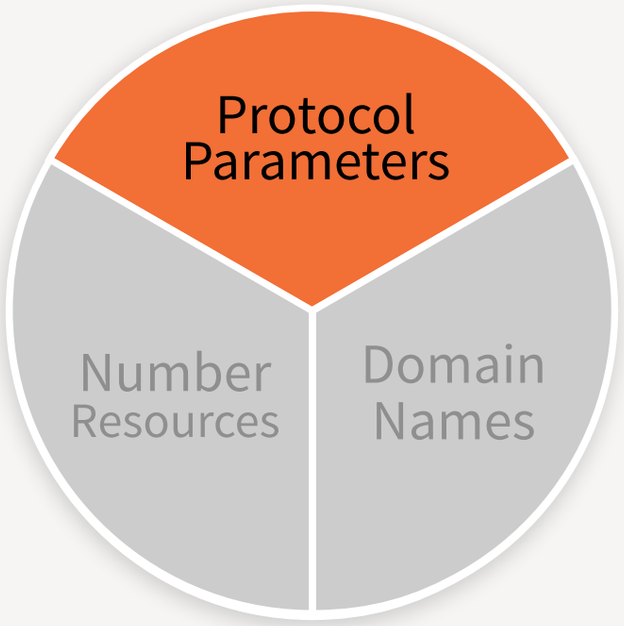
This document is the revised protocol definition for Internationalized Domain Names (IDNs). The rationale for changes, the relationship to the older specification, and important terminology are provided in other documents. This document specifies the protocol mechanism, called Internationalized Domain Names in Applications (IDNA), for registering and looking up IDNs in a way that does not require changes to the DNS itself. IDNA is only meant for processing domain names, not free text.

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc5891.



- There are thousands of protocol parameter registries spanning many different technologies

around **3,000** protocol parameter registries

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Protocol Registries

Protocol Registries
Time Zone Database
IANA's Performance
IETF Draft Status

Protocol Registries

IANA is responsible for maintaining many of the codes and numbers contained in a variety of Internet protocols, enumerated below. We provide this service in coordination with the Internet Engineering Task Force (IETF).

For more information on how to create registries, please see RFC 5226, Section 4. This document also covers the requirements for IANA Considerations in RFCs.

To view the various protocol registries, just click on their titles. To apply to modify a registry, use the relevant form. The qualifications for changing a protocol vary depending on the governing standards documents.

A B C D E F G H I J K L M N O P Q R S T U V W X Y

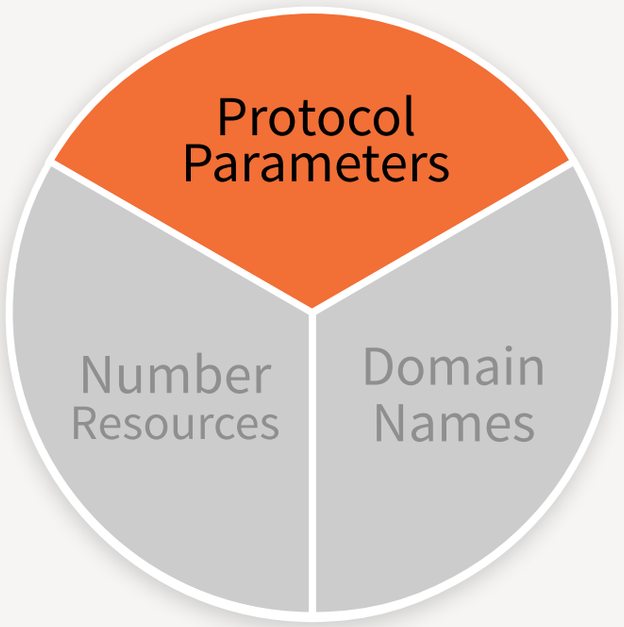
Protocol/Registry	Defining Document/Comments
	A
Access Node Control Protocol (ANCP)	
ANCP Capability Types	RFC 6320 Standards Action
ANCP Command Codes	RFC 6320 Standards Action
ANCP Message Types	RFC 6320 Standards Action
ANCP Port Management Functions	RFC 6320 Standards Action
ANCP Result Codes	RFC 6320 0x0-0xFFF: IETF Review. 0x1000-0xFFFFFF: Specification Required.
ANCP Technology Types	RFC 6320

(OPT)

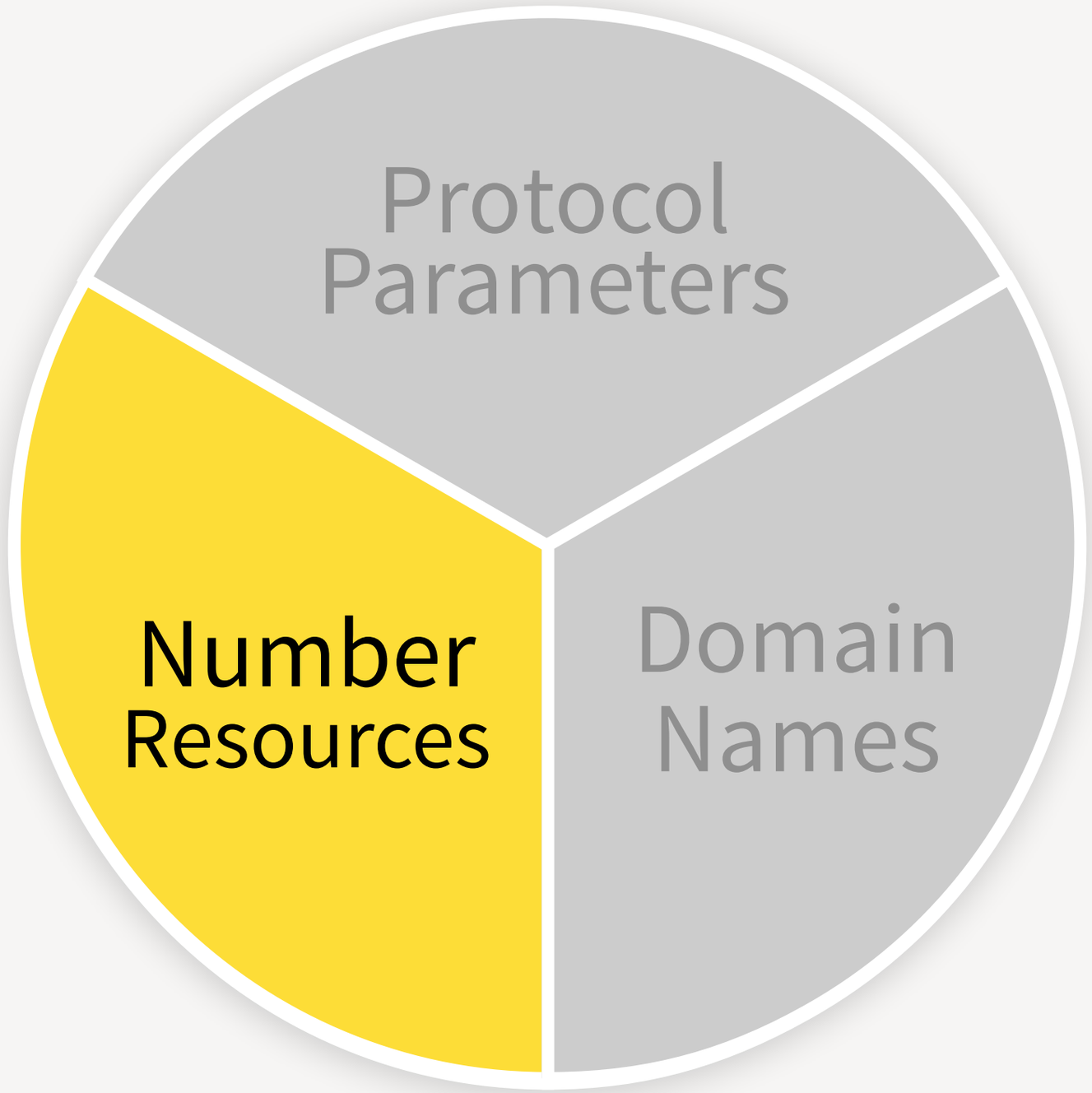
DNS KEY RR Pr
DNS Label Typ
DNS OpCodes
DNS RCODEs

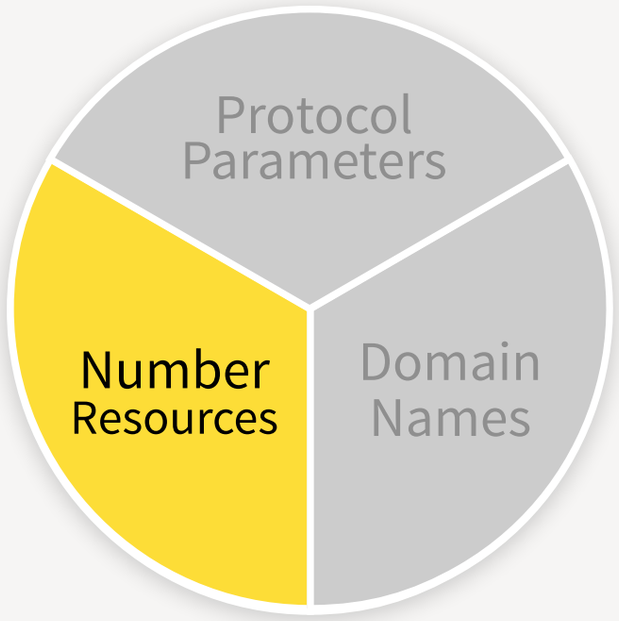
Application A
ACAP Capa
ACAP Respo
Dataset Cla
Vendor Sub
Application Br
ABFAB URN

Bidirectional Forward
BFD Authentication T
BFD Diagnostic Codes
Bit Index Explicit Replicat
BIER Algorithm
BIER Next Protocol Identif
Blocks Extensible Exchange
BEEP Features
BEEP Profiles
Border Gateway Protocol (BGP)
Additional PMSI Tunnel Attribu Flags
BGP AIGP Attribute Types



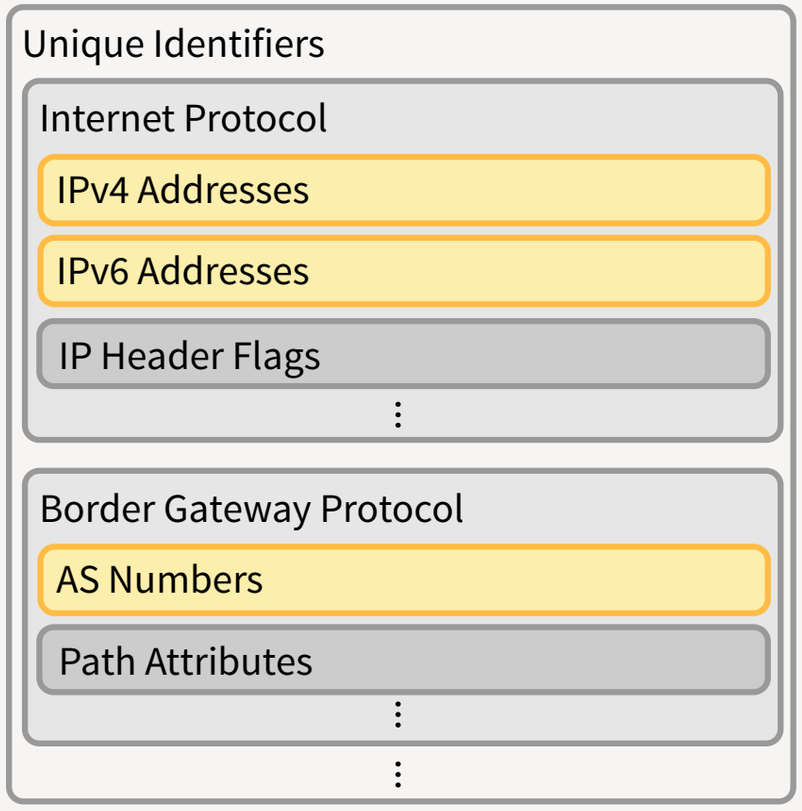
- IANA role includes:
  - Maintaining and publishing registry data
  - Receiving and evaluating requests to create new registries and to add new values to registries
  - Providing advice on upcoming standards efforts on how it would be implemented as part of the IANA functions

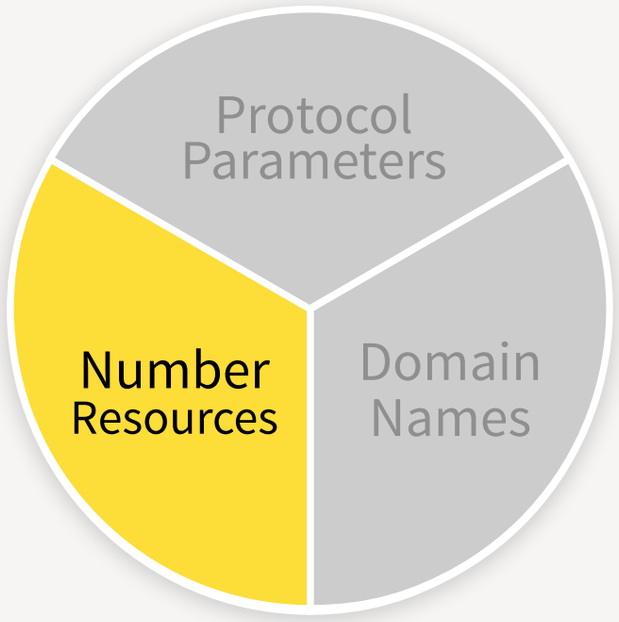

Protocol Parameters
Number Resources
Domain Names



Number Resources are specialized forms of protocol parameters:

- IP Addresses: unique identifiers for devices on the Internet
- Autonomous System (AS) numbers: unique identifiers that group networks on the Internet





- Number Resources are predominantly hierarchically delegated through five Regional Internet Registries
  - RIRs in turn delegate them to ISPs and network operators in their region
  - Some specialized allocations are made directly by IANA (e.g. multicast)
- Deterministic decision making is used. Recently we launched an RIR Dashboard to show calculations against eligibility requirements

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Internet Assigned Numbers Authority

DOMAINS NUMBERS PROTOCOLS ABOUT US

Number Resources

Overview
RIR Allocation Data
Overview
IPv6 (AFRINIC)
IPv6 (APNIC)
IPv6 (ARIN)
IPv6 (LACNIC)
IPv6 (RIPE NCC)
ASN (AFRINIC)
ASN (APNIC)
ASN (ARIN)
ASN (LACNIC)
ASN (RIPE NCC)
Abuse Issues
Overview
Questions and Answers

Number Resource Allocation Data

Our primary role in managing Internet number resources is to provide po
and AS numbers to Regional Internet Registries (RIRs) according to their
Global Addressing Policies.

These policies contain allocation algorithms that are based on the level of
allocations. We track allocation rates here and provide analysis of eligibilit

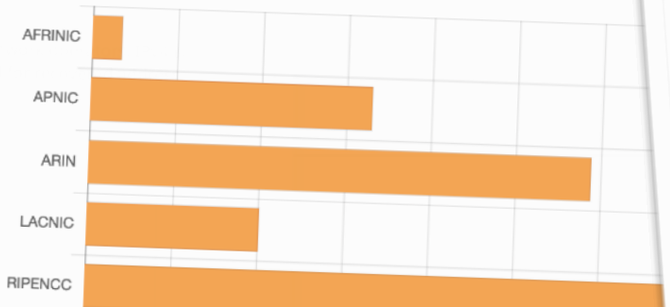
IP Address Allocations

The chart below summarizes allocations of IPv6 addresses RIRs have mad
not represented as IANA's supply has been exhausted and our allocation
space does not factor in utilization.

Detailed information is available for each RIR by clicking the chart.

Autonomous System Number Allocations

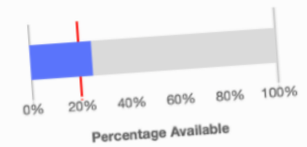
The chart below summarizes allocations of AS numbers that RIRs have made to net
Detailed information is available for each RIR by clicking the chart.



RIPE NCC ASN Allocations

Allocations of autonomous system numbers are made to regional Internet registries according to their needs, based on allocation rates they publish. Specifically, RIRs are eligible for further allocations if their available address space is 80% allocated, or the available pool does not satisfy two months of need based on the previous six months' average allocation rate.

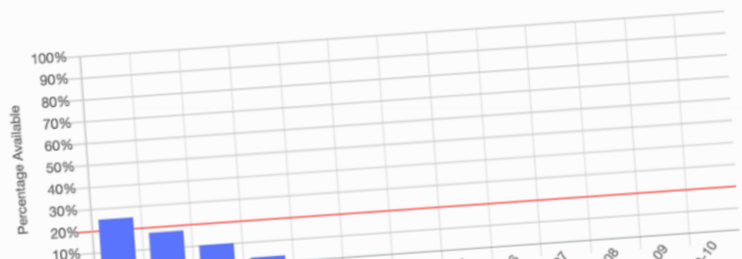
Current Pool and Eligibility

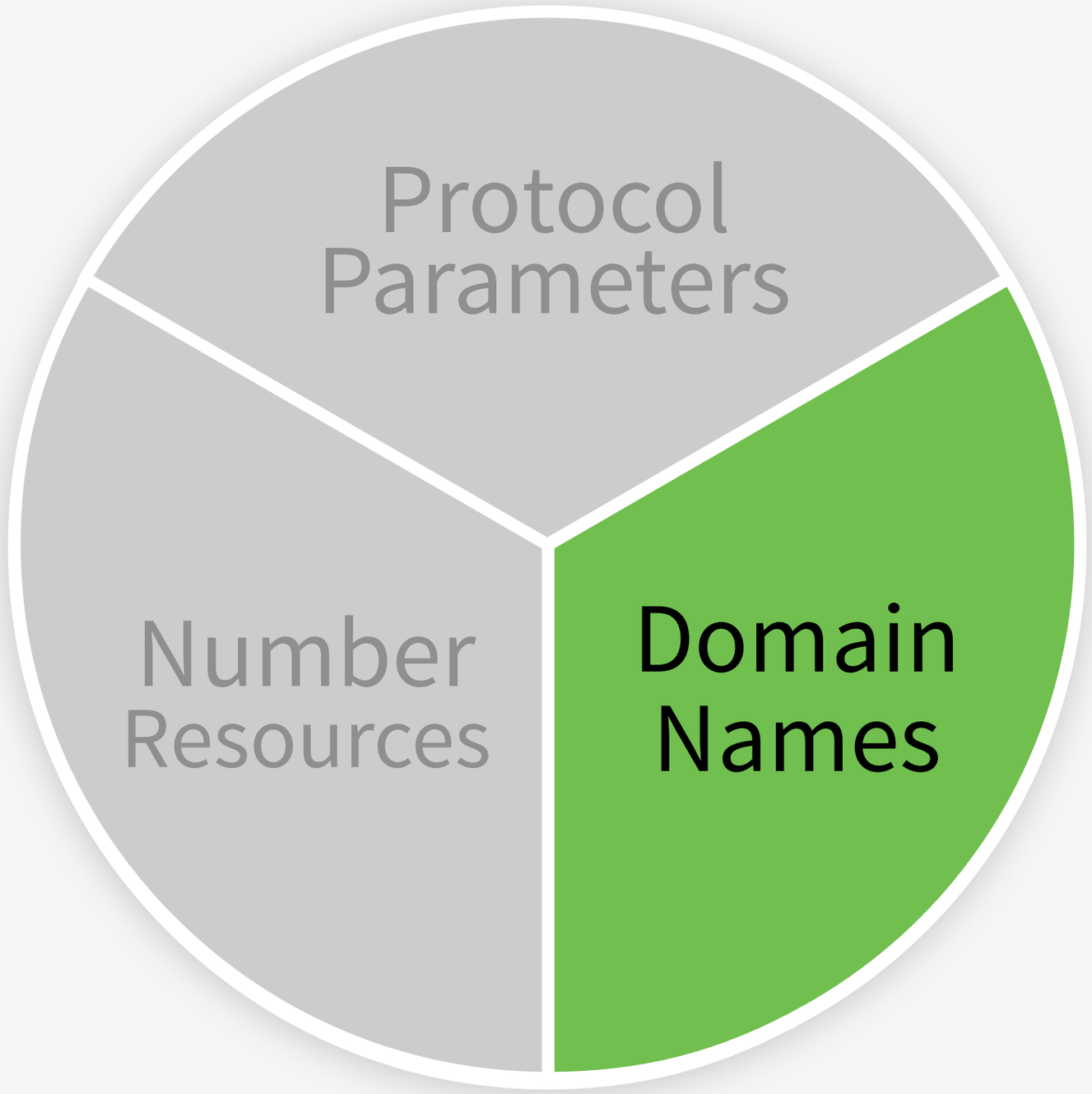


Eligibility	Not Eligible
Available	756
Two Month Need	454
Monthly Average	227
Last Allocation by IANA	3,072 ASNs (2018-08-20)

12 Month Forecast

The graph below uses RIPE NCC's current average allocation rate to forecast their available ASN space over the next 12 months. This can be used to estimate if RIPE NCC will become eligible to apply for additional AS Numbers in the near future.

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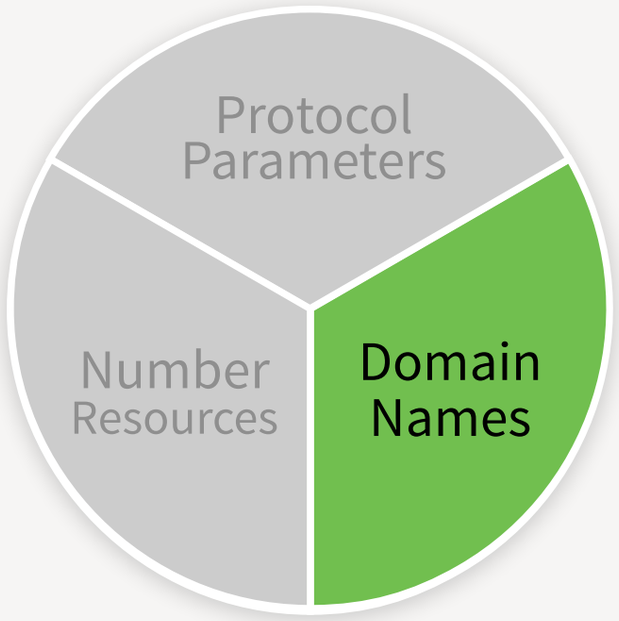
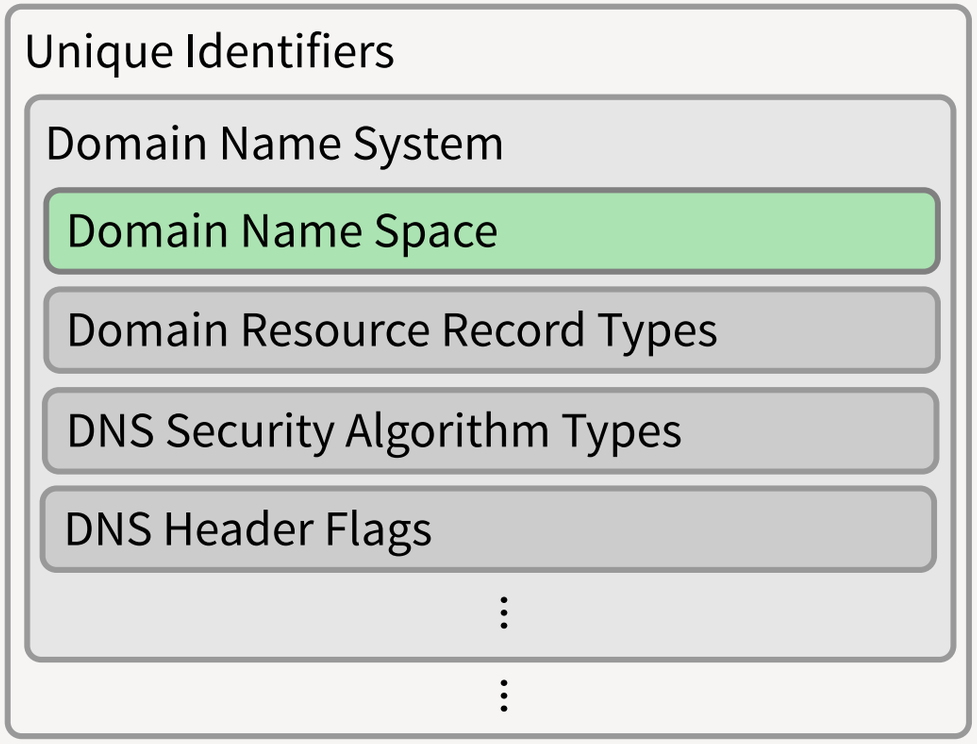
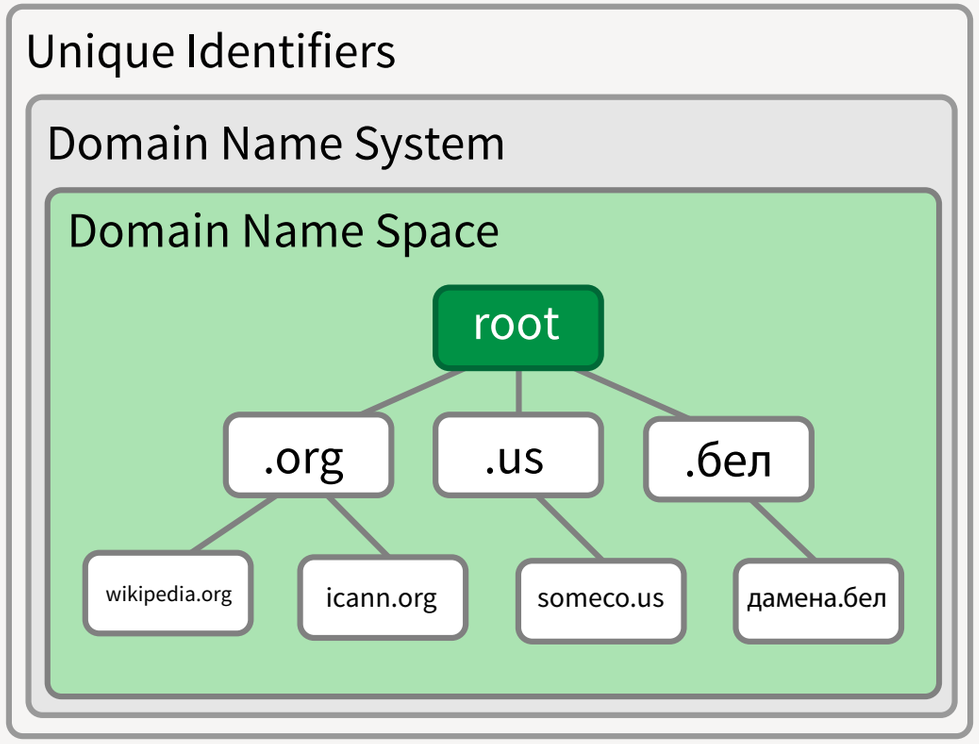
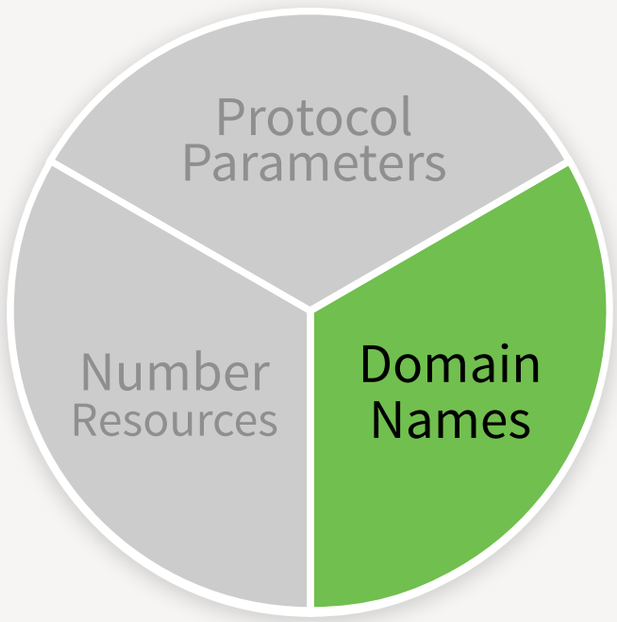


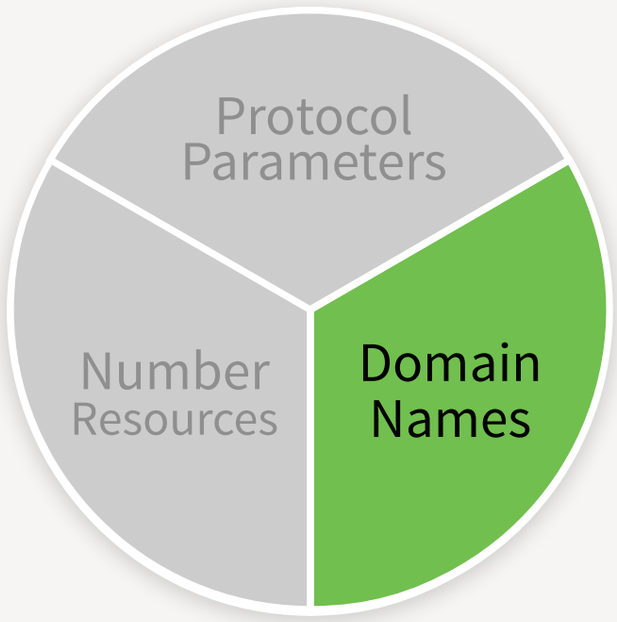
- Most notable IANA function is managing the DNS root zone, which defines top-level domains
- Like number resources, the domain name space is hierarchically delegated, with IANA responsible for the upper-most level of allocations



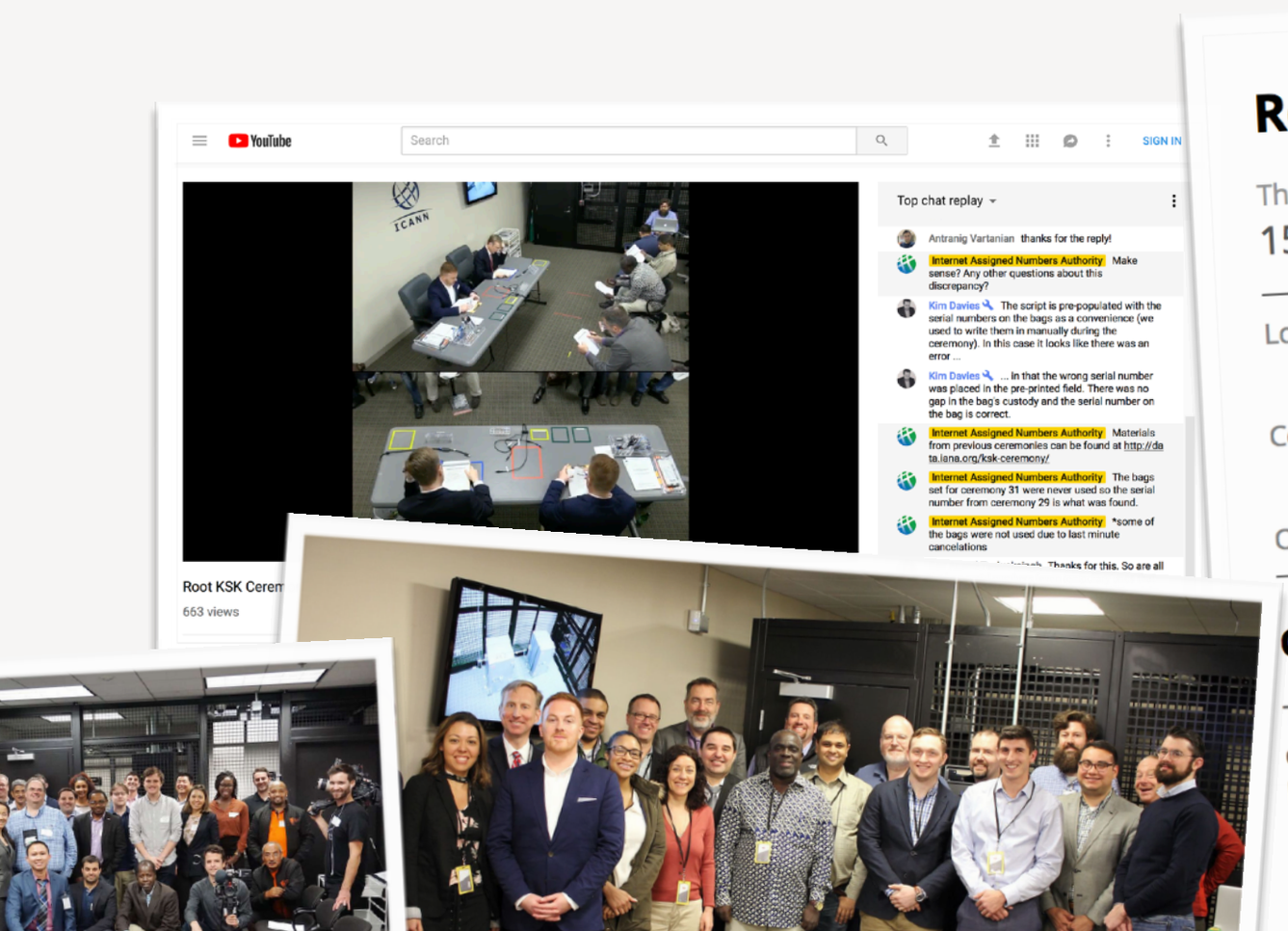


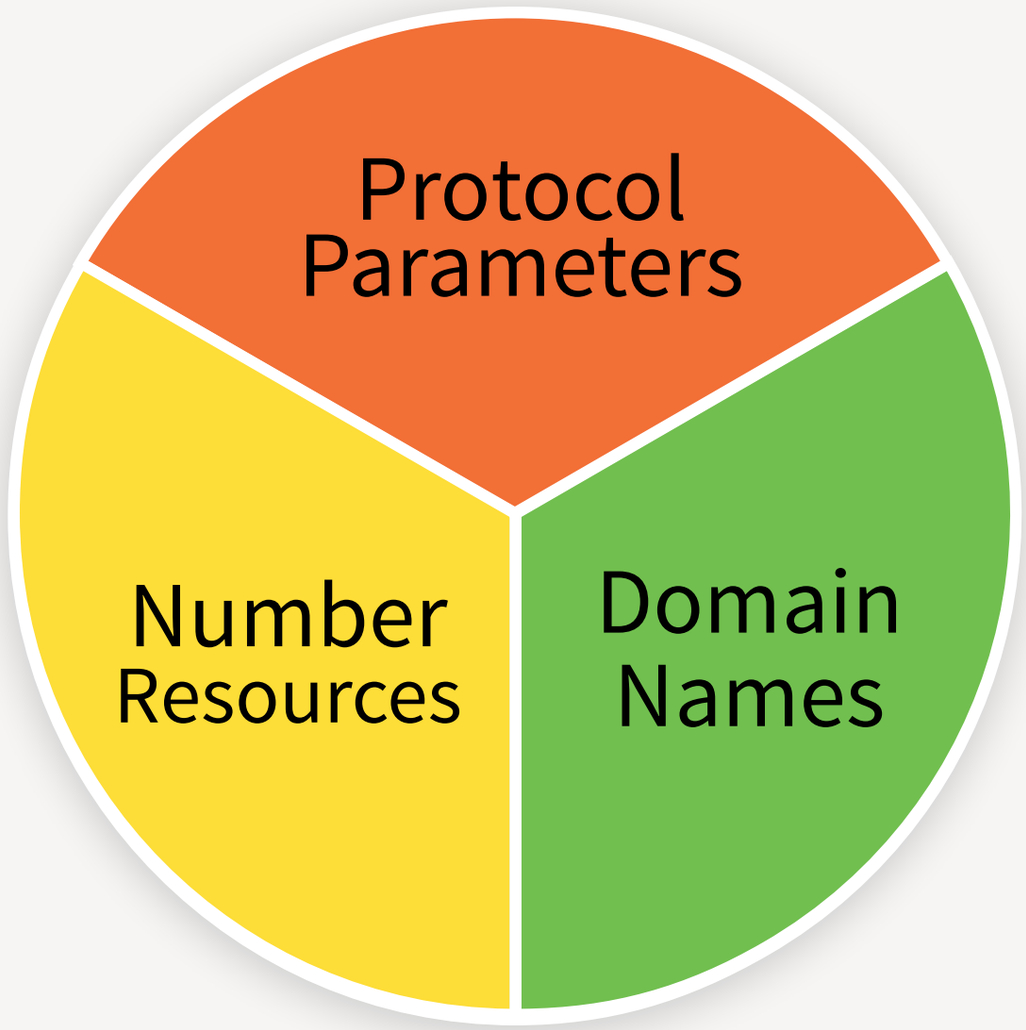


- The IANA tasks include:
  - Receiving and evaluating root zone changes requests against policies and operational requirements:
    - Assignment and transfer of TLDs
    - Routine maintenance of name servers and other technical elements
    - Points of Contact
  - Transmitting vetted changes for implementation in the root zone and root servers
  - Operating the .INT domain for intergovernmental treaty organizations
  - IDN table/LGR repository maintenance

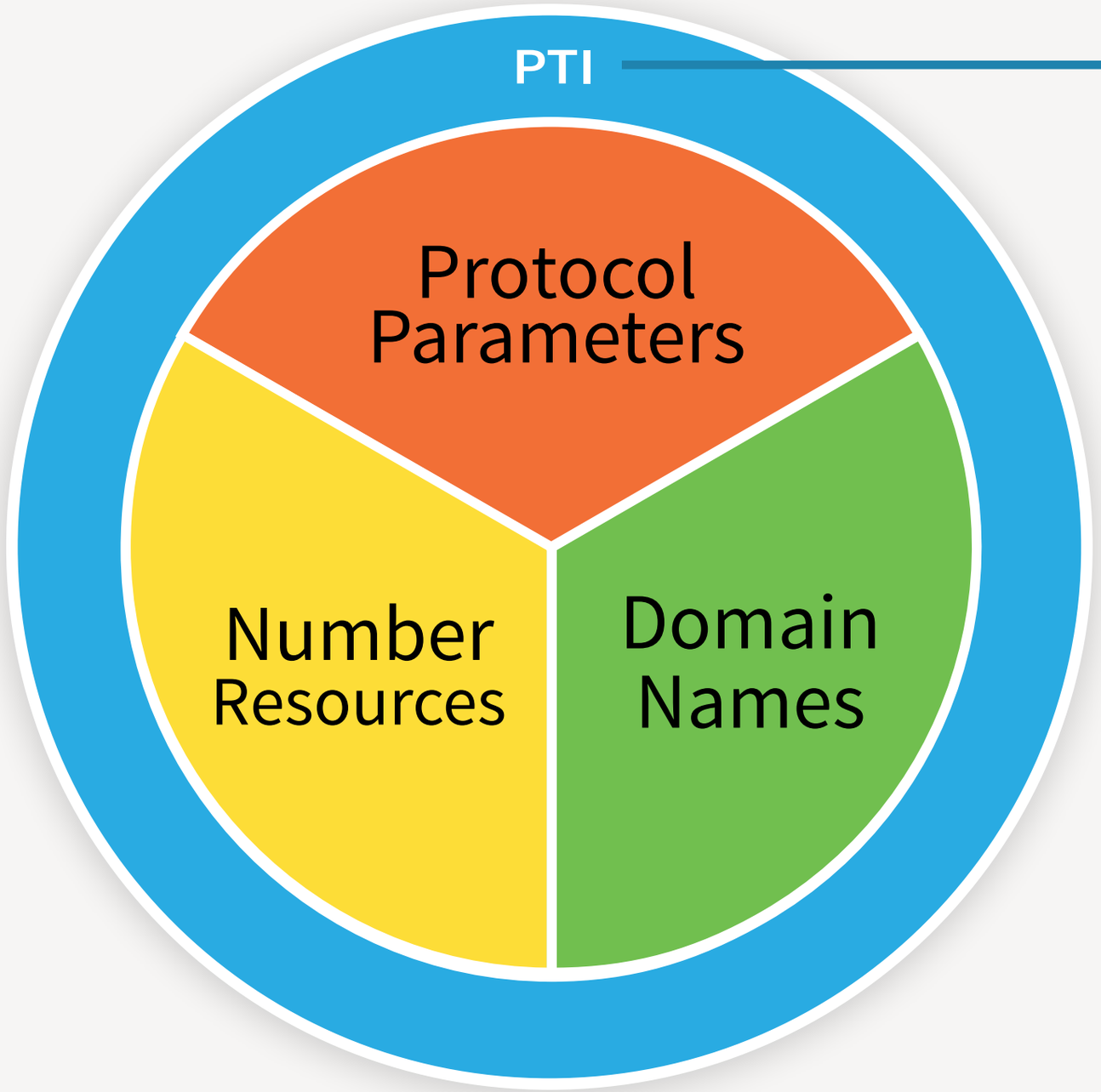


- Managing the trust anchor for the DNS (the “Root Zone Key Signing Key”)
  - Using the key happens in public “key signing ceremonies”, involving trusted community representatives and other oversight.
  - Includes managing the lifecycle of the key, including when it is replaced (a “rollover”)



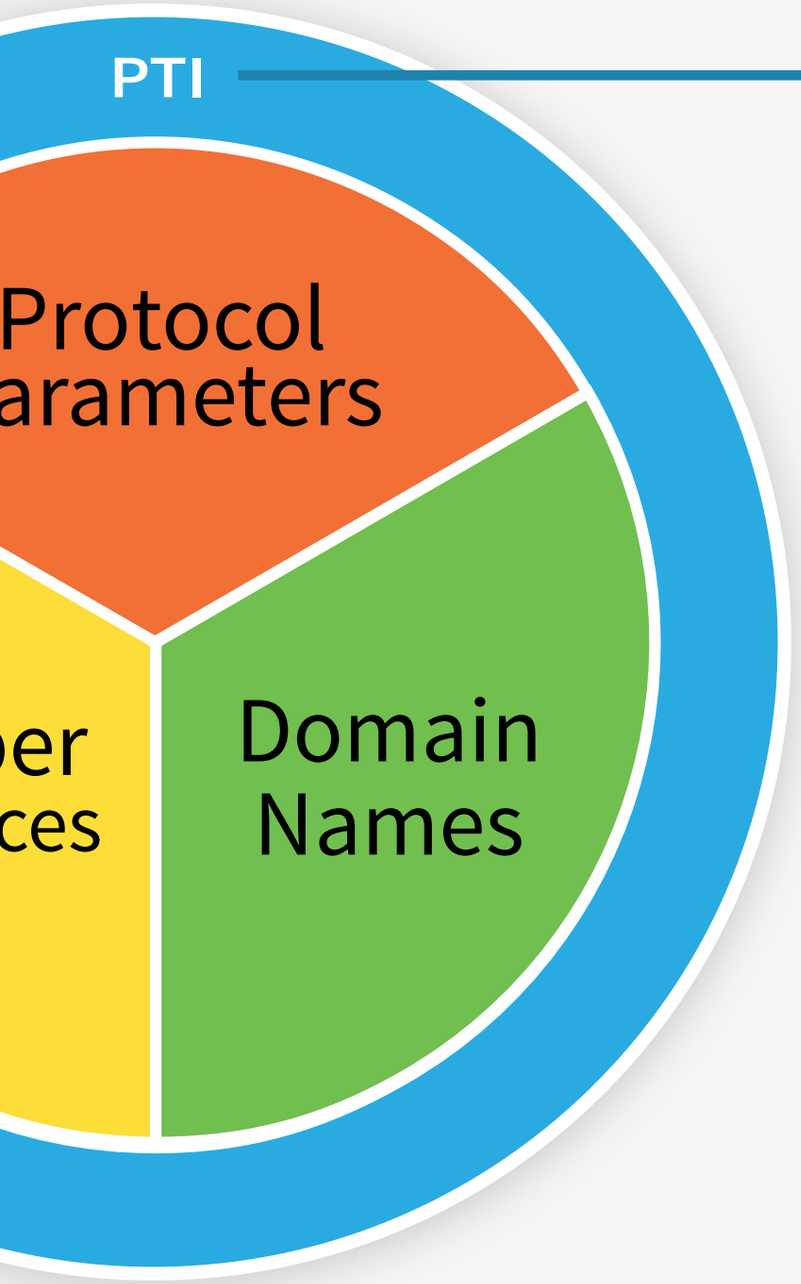


- Together, protocol parameters, number resources and domain names comprise the IANA functions
- These divisions also represent the three different accountability mechanisms for these functions



Public Technical Identifiers

- Performs the IANA functions
- Hires the IANA staff
- Is a non-profit organization created in 2016
- ICANN is its sole member (i.e. affiliate of ICANN)



IANA Staff

Alan Akahoshi
PRODUCT MANAGER

Shaunte Anderson
AUDIT

Amanda Baber
REQUEST SPECIALIST

Michelle Cotton
IETF RELATIONS

Kim Davies
PRESIDENT

Aaron Foley
CRYPTO OPERATIONS

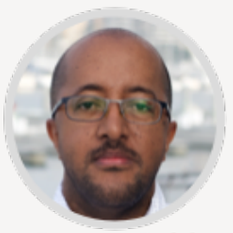
Selina Harrington
REQUEST SPECIALIST

Marilia Hirano
PROGRAM MANAGER

Jennifer Johnson
PROJECT COORDINATOR

Ali Mohammadi
SOFTWARE

Andres Pavez
CRYPTO OPERATIONS



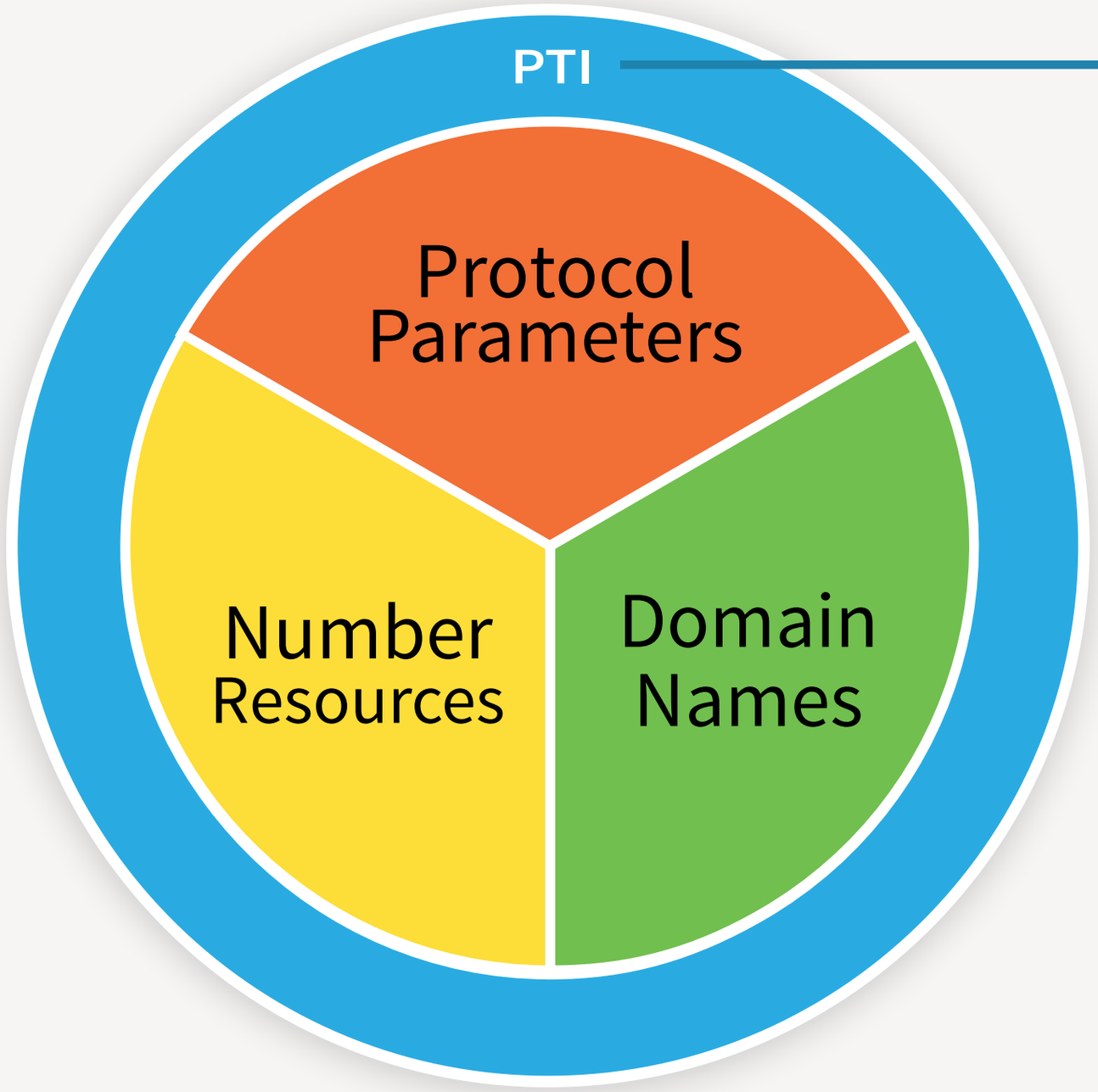
Seman Said
SOFTWARE

George Sarkisyan
REQUEST SPECIALIST

Naela Sarras
OPERATIONS DIRECTOR

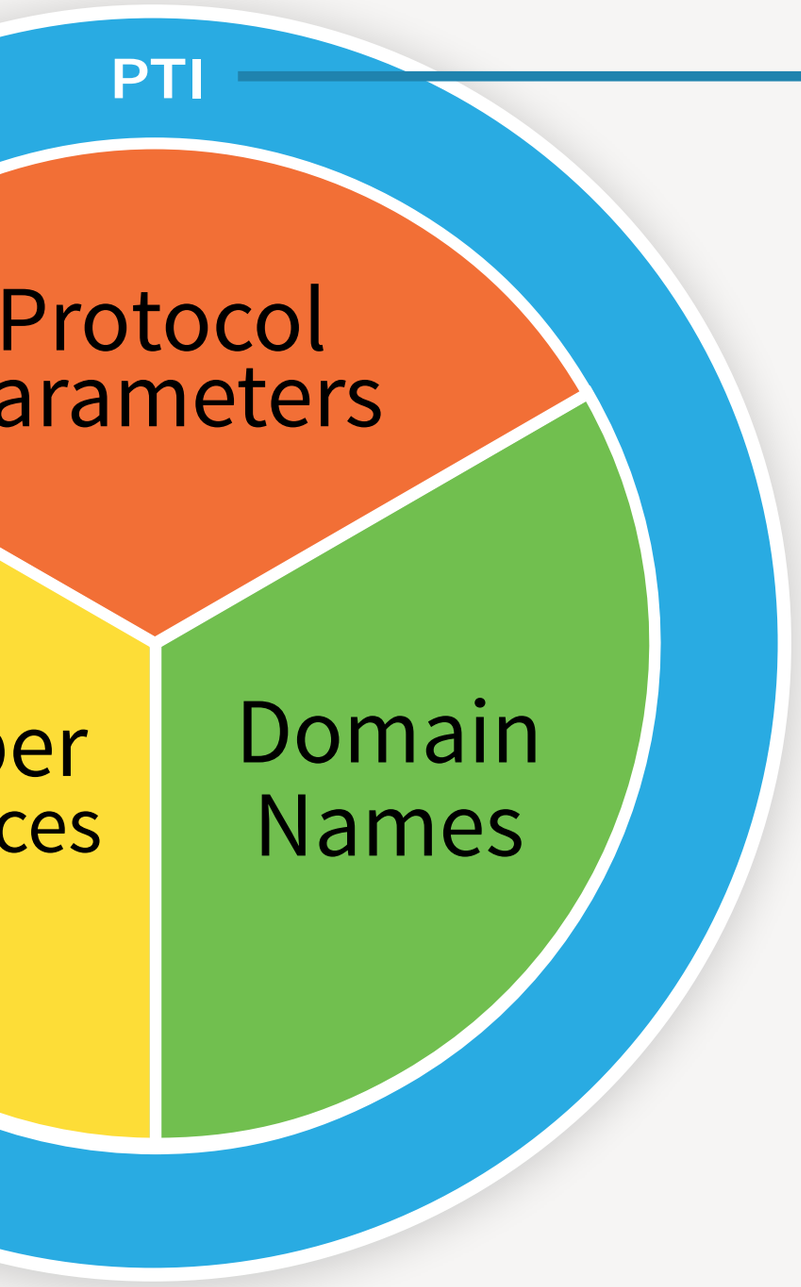
Sabrina Tanamal
REQUEST SPECIALIST

Michelle Thangtamsatid
REQUEST SPECIALIST



Public Technical Identifiers

- Five-member board of directors including 2 Nomcom appointees



PTI Board

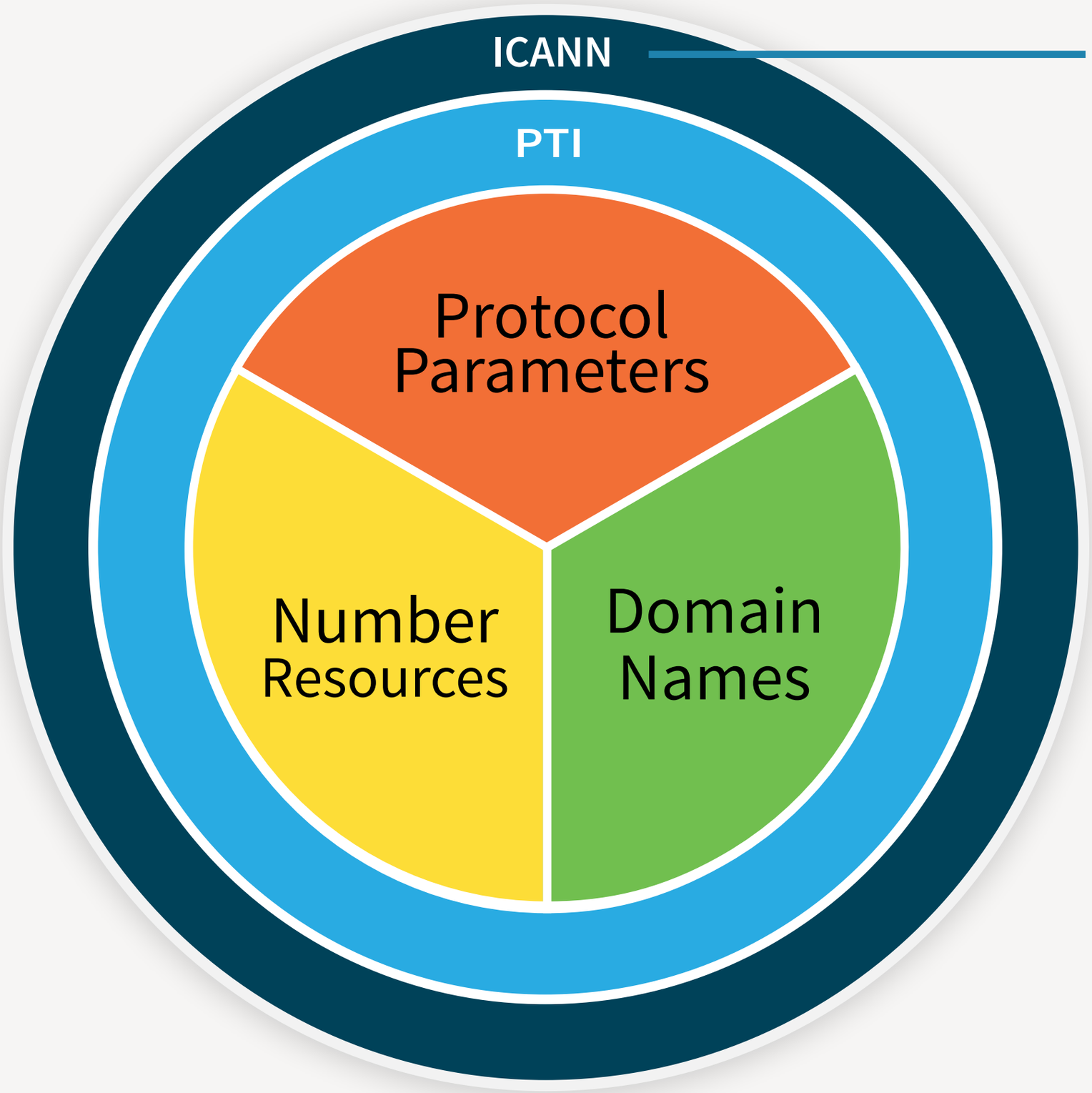
Lise Fuhr
CHAIR
NOMCOM APPTEE

Wei Wang
NOMCOM APPTEE

Kim Davies
PTI PRESIDENT

David Conrad
ICANN CTO

Jia-Rong Low
ICANN VP, APAC



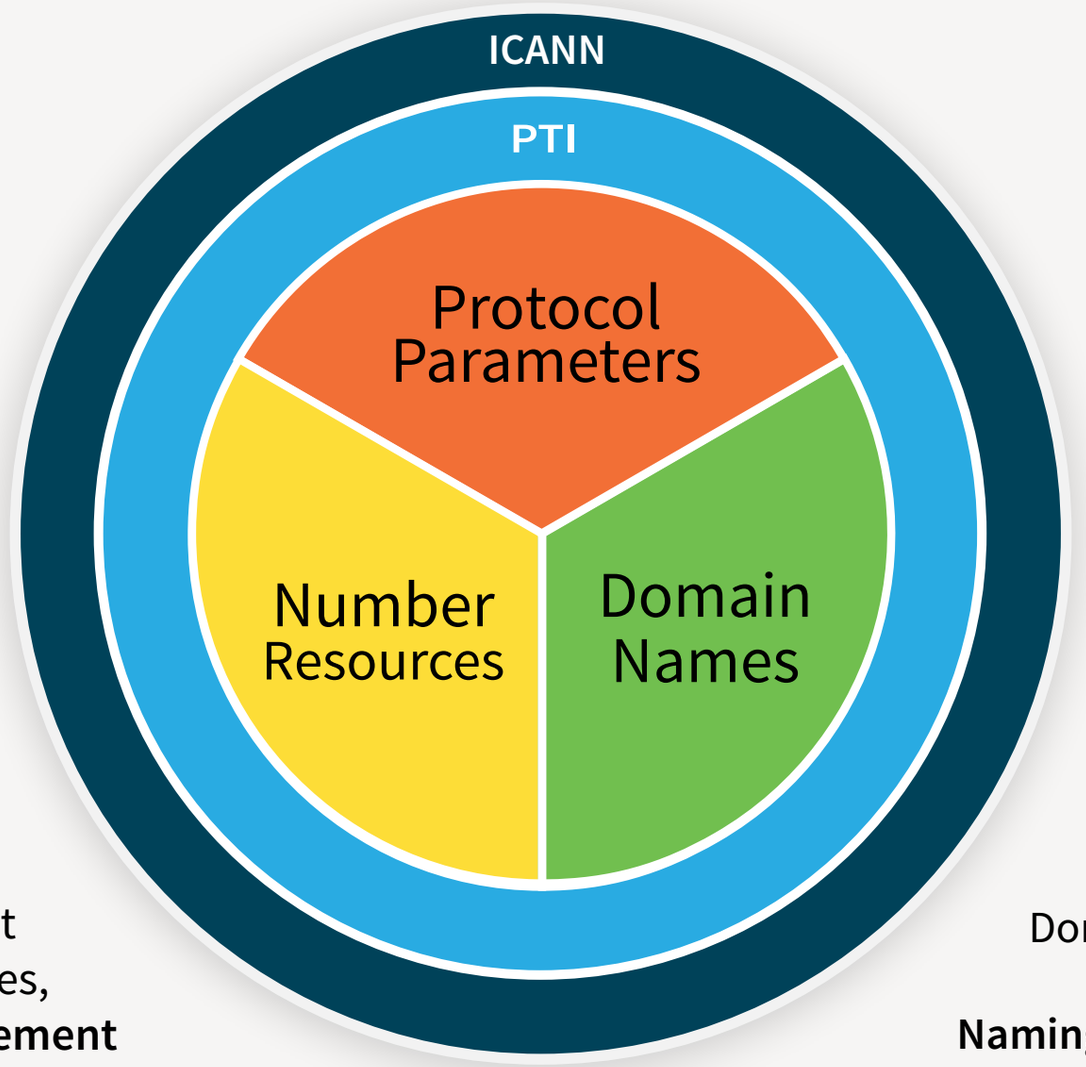
ICANN

- Responsible for the IANA functions
- Contracts PTI to perform the IANA functions
- Oversees PTI's performance
- Provides shared and dedicated resources (Legal, IT, HR, Finance and many others)
- Provides all funding to PTI
- Operates additional accountability mechanisms such as Customer Standing Committee, IANA Naming Function Reviews

Accountability and Performance

Accountability

Protocol Parameter oversight
through **Memorandum of Understanding**
between **IETF** and ICANN,
subcontracted from ICANN to PTI

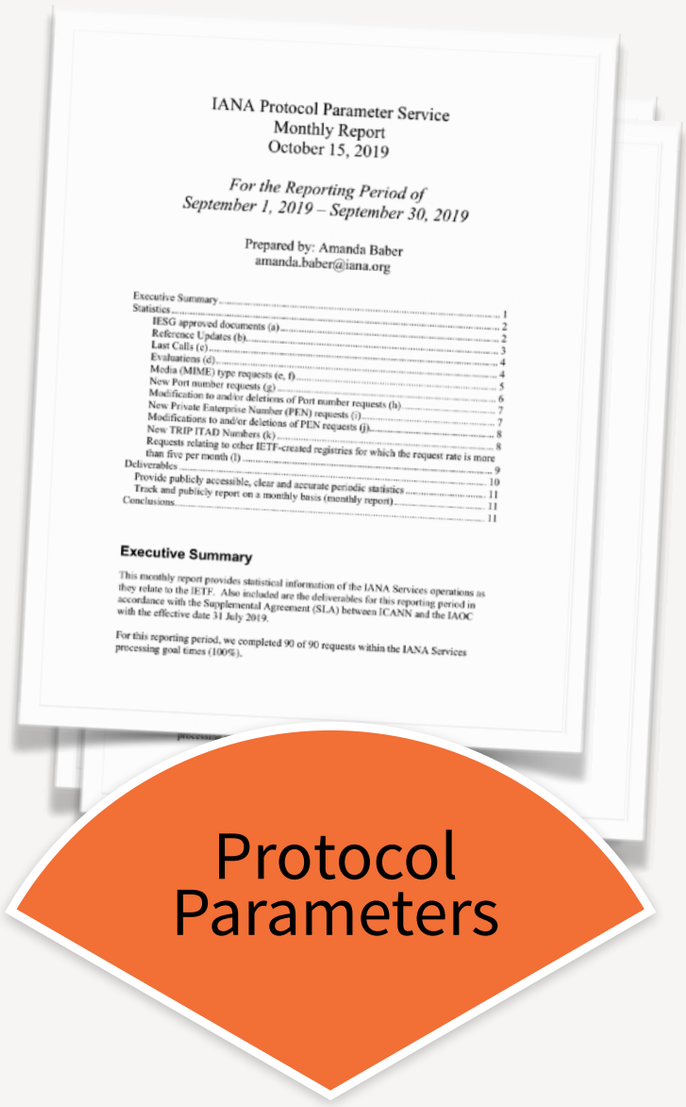


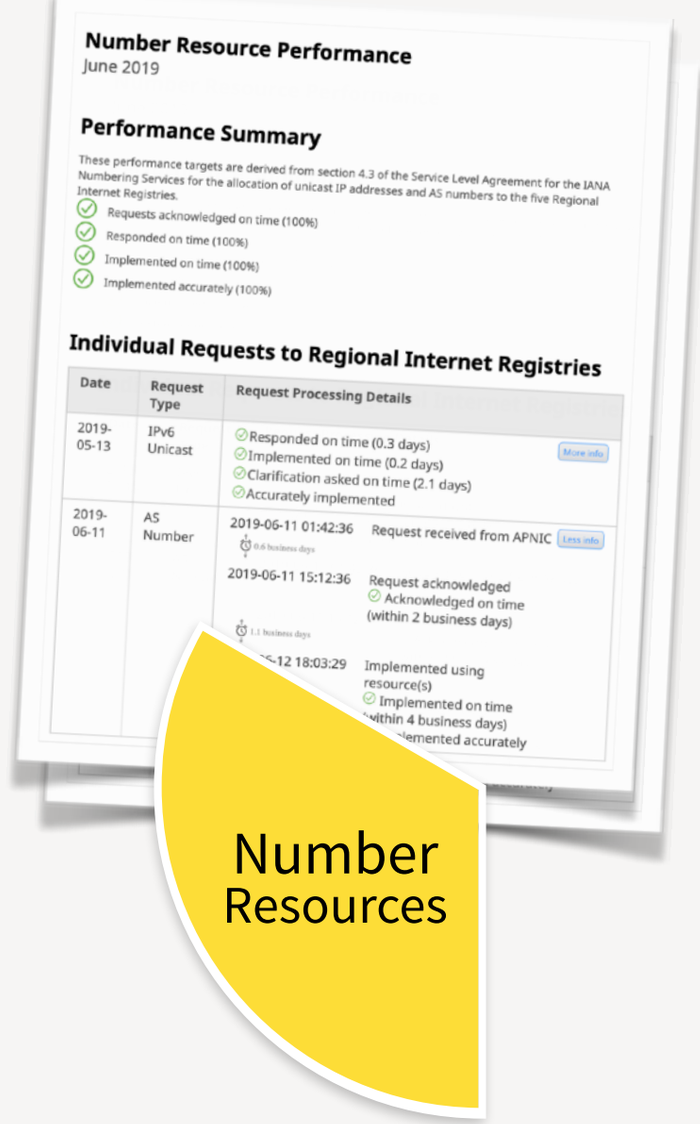
Number resource oversight
by Regional Internet Registries,
governed by **Service Level Agreement**
between ICANN and RIRs,
subcontracted from ICANN to PTI

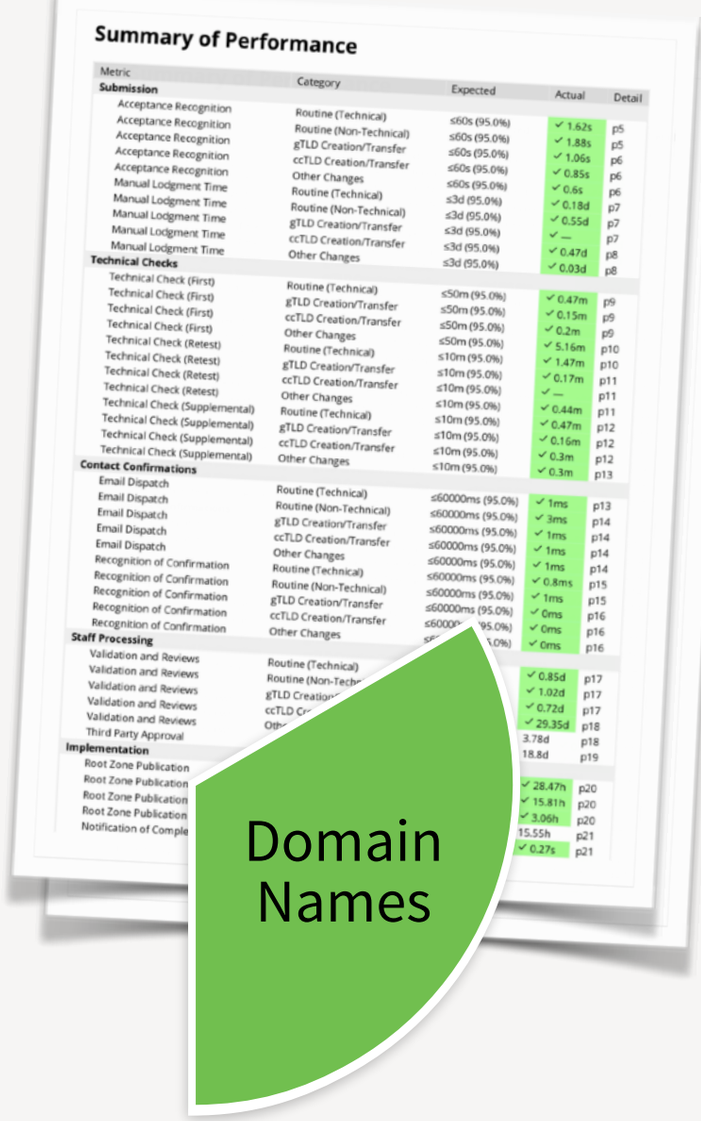
Domain Name oversight by ICANN;
governed by
Naming Contract between ICANN and PTI;
performance oversight by
ICANN Customer Standing Committee

Performance Reporting

- Monthly reporting for each of the three areas



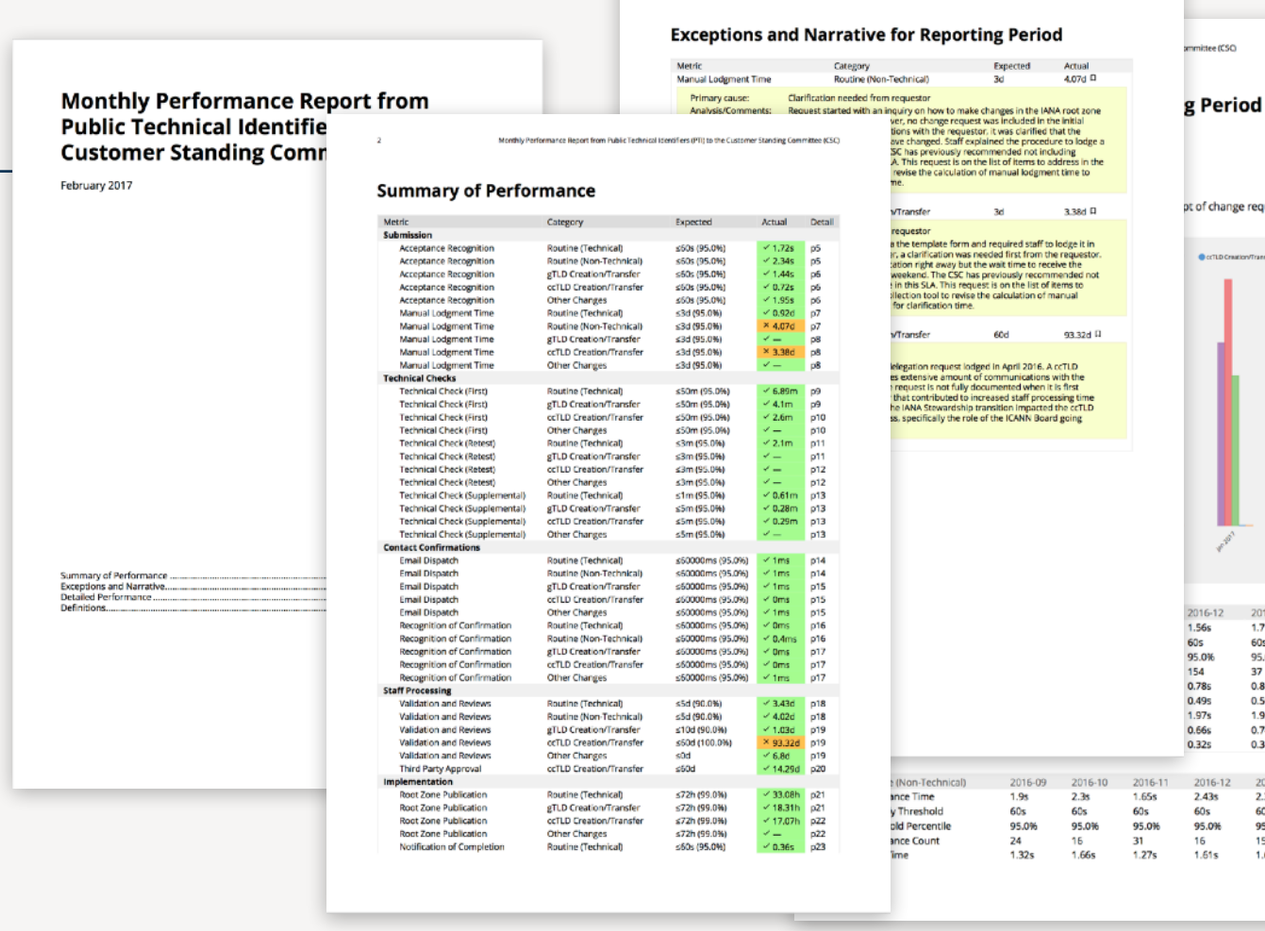




Performance Reporting

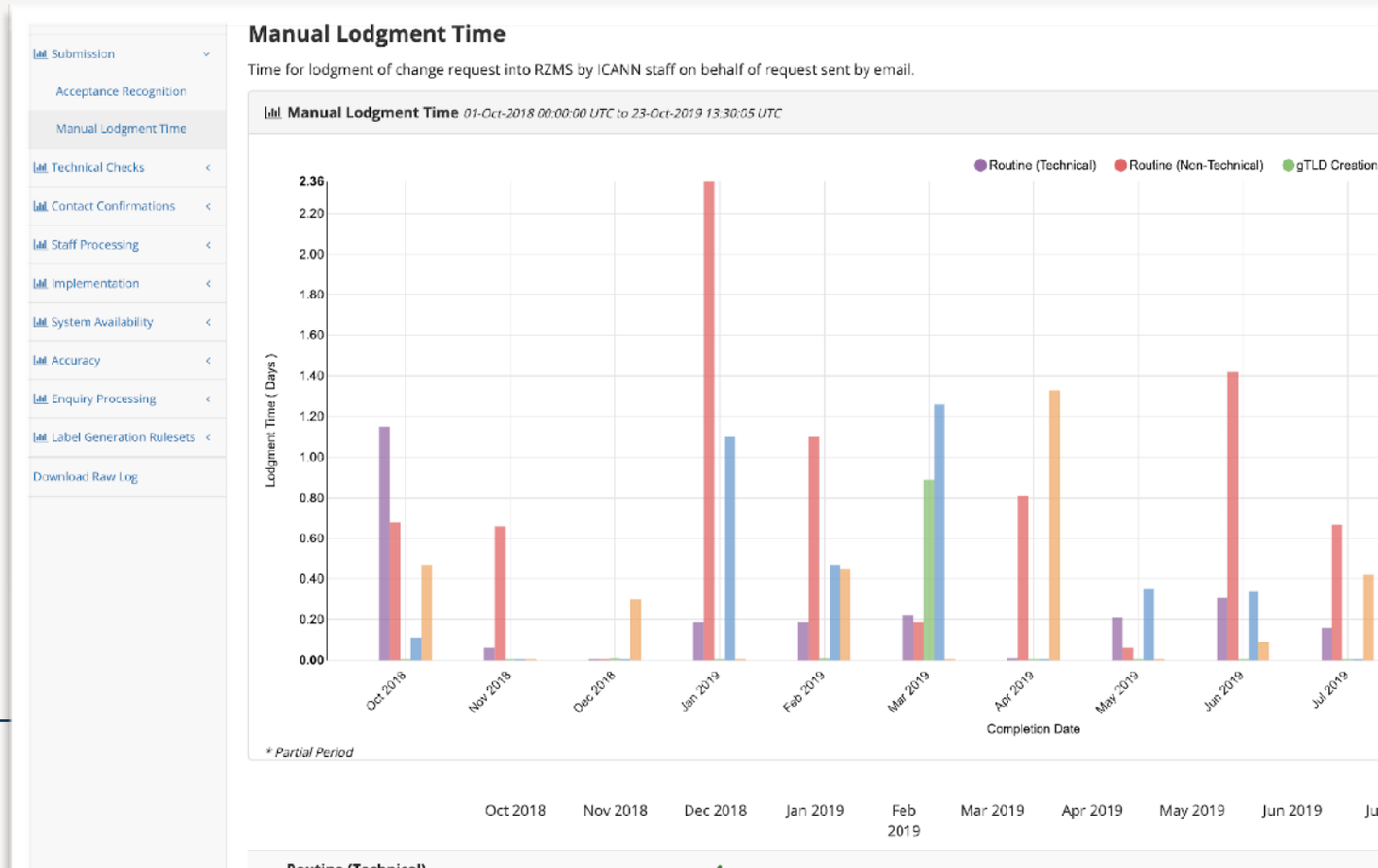
PTI produces monthly reports on its performance for its three functional areas.

iana.org/performance



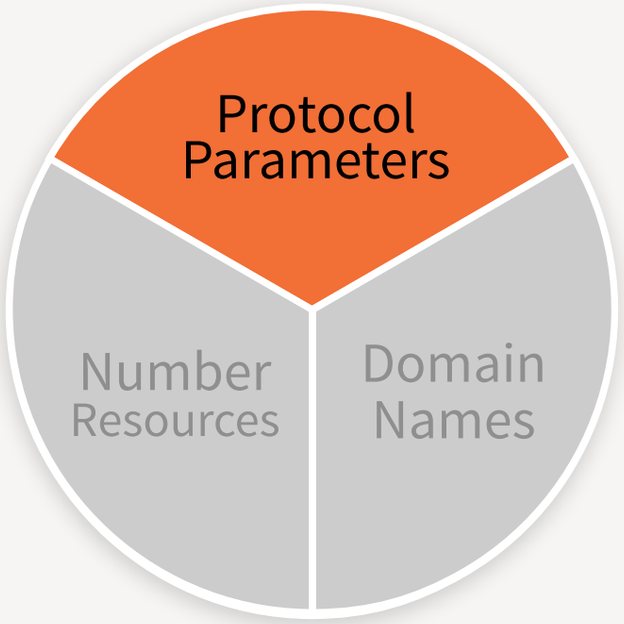
Dashboard providing real-time reporting of performance metrics defined by the naming community for root zone management performance.

sle-dashboard.iana.org



Service Level Agreements

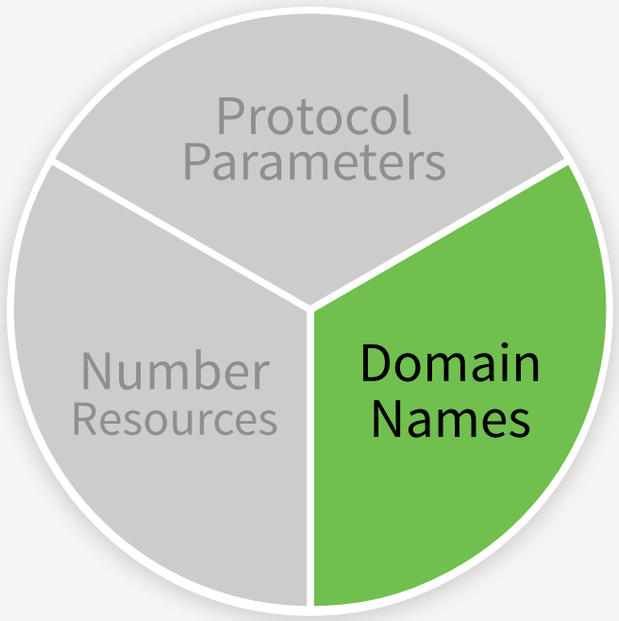
- Each three functions has service level expectations defined and reported against
  - Reports against KPIs to the IETF for protocol parameters
  - Around 70 measurement categories to the Customer Standing Committee for naming functions
  - Performance reporting to the numbering community for IP address and AS number allocations
- These figures are reviewed through various processes
  - Monthly Customer Standing Committee meetings, plus IANA Naming Function Reviews
  - Regular meetings and dialogue with IETF leadership
  - Reports to RIRs and an annual IANA Review Committee process



- SLAs are defined through an annual amendment to an MOU between ICANN and the IETF

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Number of requests	118	112	95	86	103	117	118	118	96	100	157	90
KPIs Met	100%	98%	99%	100%	100%	100%	100%	100%	99%	99%	100%	100%
Satisfactory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

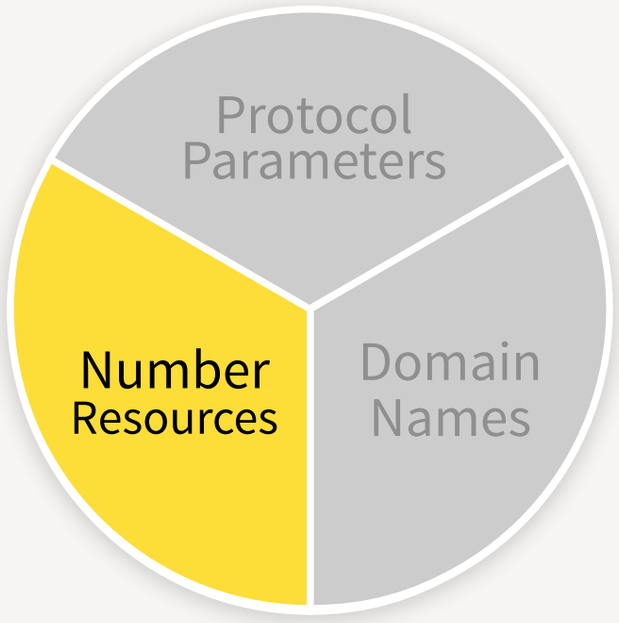
KPIs Met refers to the percentage of KPIs that met their performance target for the period.
Satisfactory means the KPIs were met to the level required by the IETF MOU



- SLAs are amended and overseen by the Customer Standing Committee

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Number of requests	30	243	37	91	307	365	254	262	259	307	1017	198
SLAs Met	100%	98%	100%	98%	100%	98%	100%	100%	100%	100%	98%	100%
Satisfactory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

SLAs Met refers to the percentage of SLA categories that met their performance target for the period.
Satisfactory means the CSC rated performance Satisfactory or higher for the period.



- SLAs are defined by the contract between ICANN and the five RIRs

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Number of requests		1				1			2			
SLAs Met	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Satisfactory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

SLAs Met refers to the percentage of SLA categories that met their performance target for the period.

Beyond service level reporting

- Audit processes
- Monitoring customer satisfaction
- Business Excellence
- Engagement

Information Security Audit Programs

- The system controls used for delivering the IANA functions are independently audited, with controls a big part of the team's culture.
- These audits help us constantly monitor and improve our systems.

Root Zone KSK
Since 2010, issued without exception annually. Audits the security controls that govern the Root Zone Key Singing Key.

Registry assignment & maintenance systems

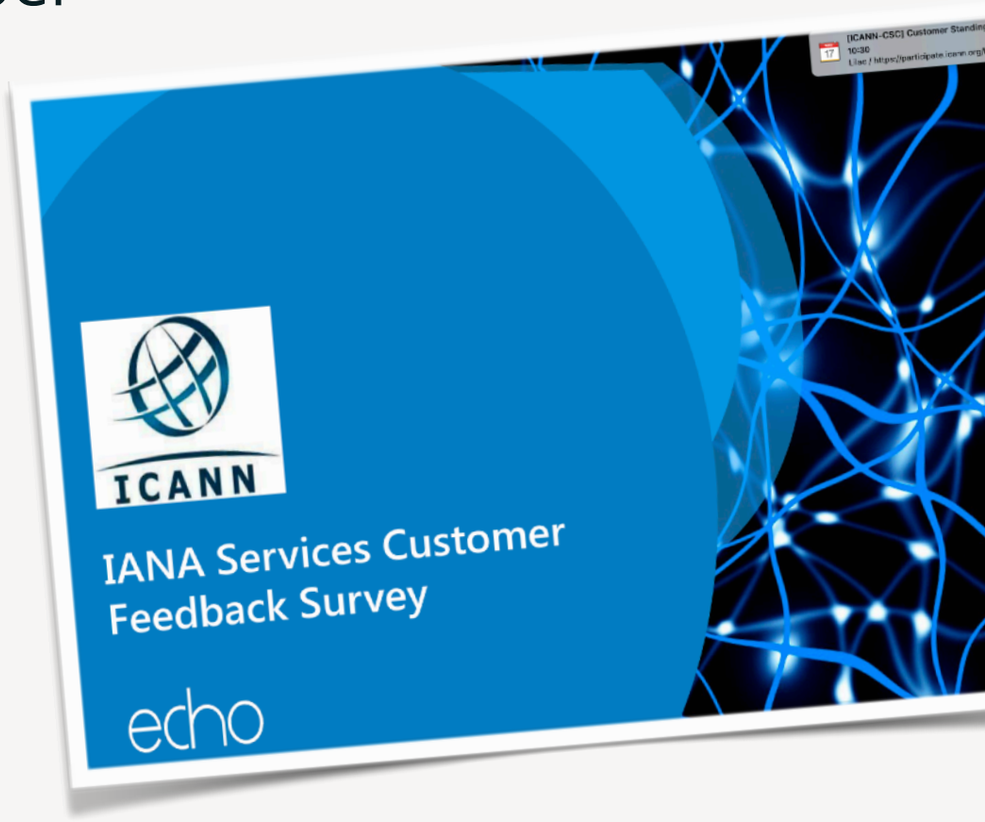
Since 2013. Covers the systems we use to process change requests, covering all three areas. Provides detailed assessment provided to our community partners.

https://iana.org/audits

Measuring customer satisfaction

Annual Survey

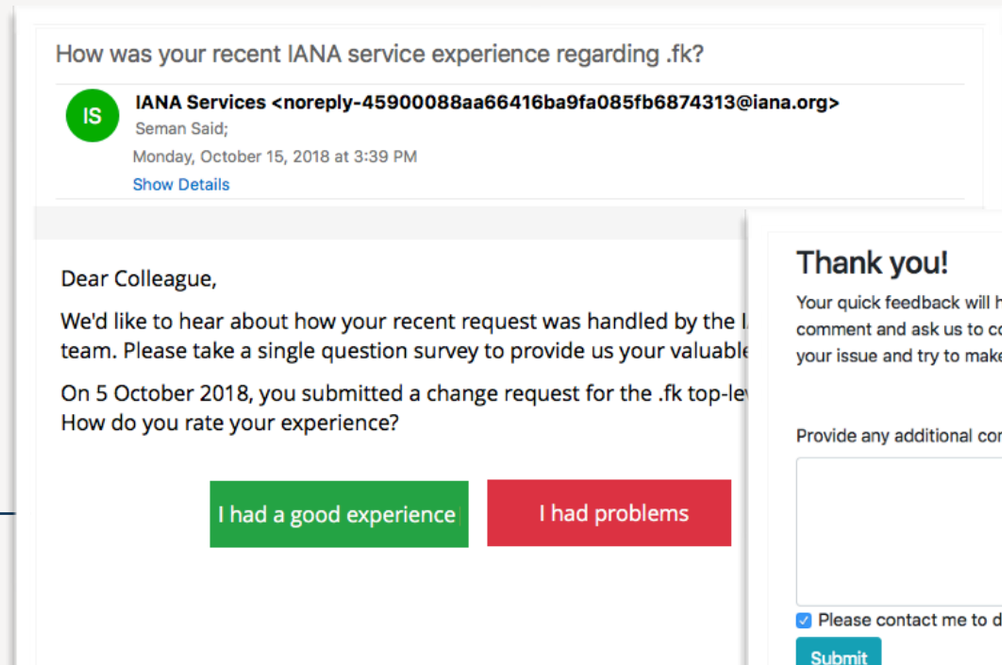
- Administered by a third party vendor since 2013
- Refined approach in 2019 to focus on engagement
  - Response Rate: 3%
  - Overall Satisfaction: 3.6 (1-5 scale)
- Detailed report was published in December



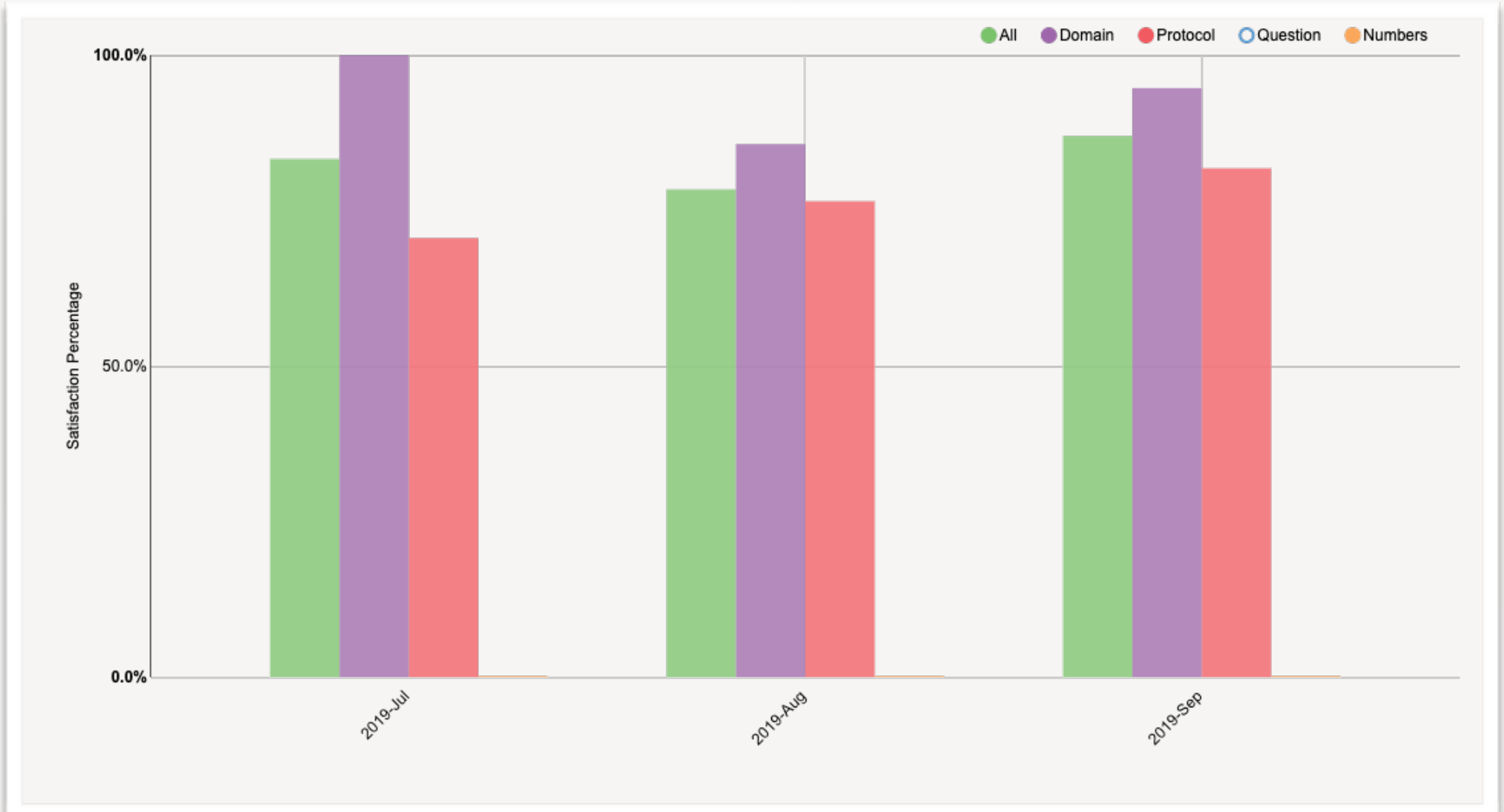
Measuring customer satisfaction

“How did we do?”

- Launched this year
- Survey sent to customer after request is resolved
- Feedback addressed or escalated within days
- Average monthly satisfaction rate: 86%
- Average monthly response rate: 36%
- Improvements:
  - Distinguish dissatisfaction with policy versus service
  - Tools still being enhanced



Customer Satisfaction in recent months

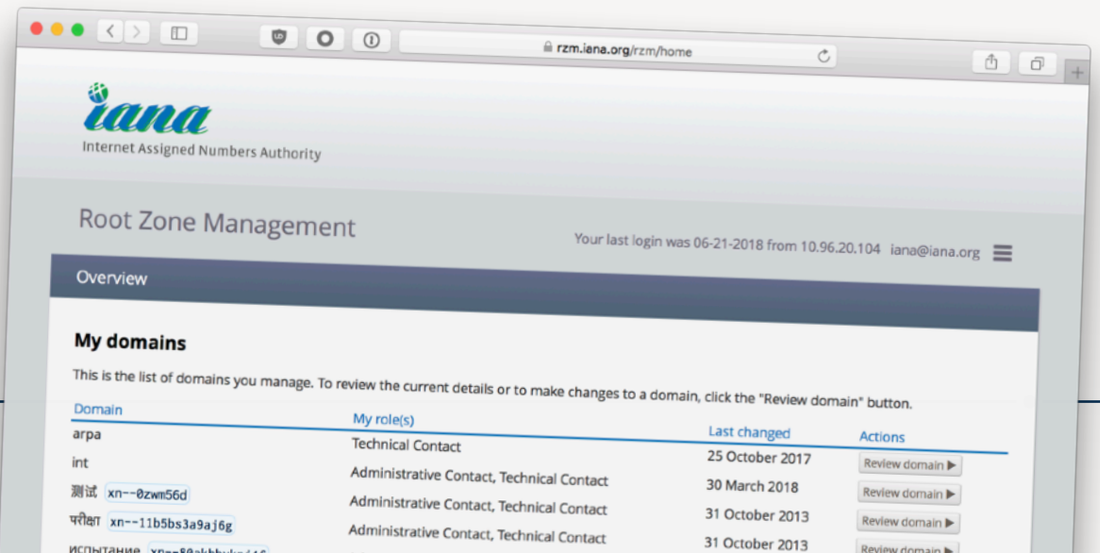


	2019-Jul	2019-Aug	2019-Sep
+ Satisfaction Rate (all)	83.3%	78.4%	87.0%
+ Satisfaction Rate (domain)	100.0%	85.7%	94.7%
+ Satisfaction Rate (protocol)	70.6%	76.5%	81.8%
+ Satisfaction Rate (number)	0%	0%	0%

Constant Improvement

- We are constantly working on ways to improve our service
- We have had SLAs with the community since 2007.
- We've been implementing business excellence and quality management since 2009, achieving certification in 2013 in the EFQM model.
  https://www.iana.org/about/excellence
- We've conducted annual customer surveys since 2012
- We develop systems and tools to support our work:
  - ticketing systems
  - Root Zone Management System
  - automation
  - a new Protocol Parameter Management System

EFQM®
Committed to excellence
2013



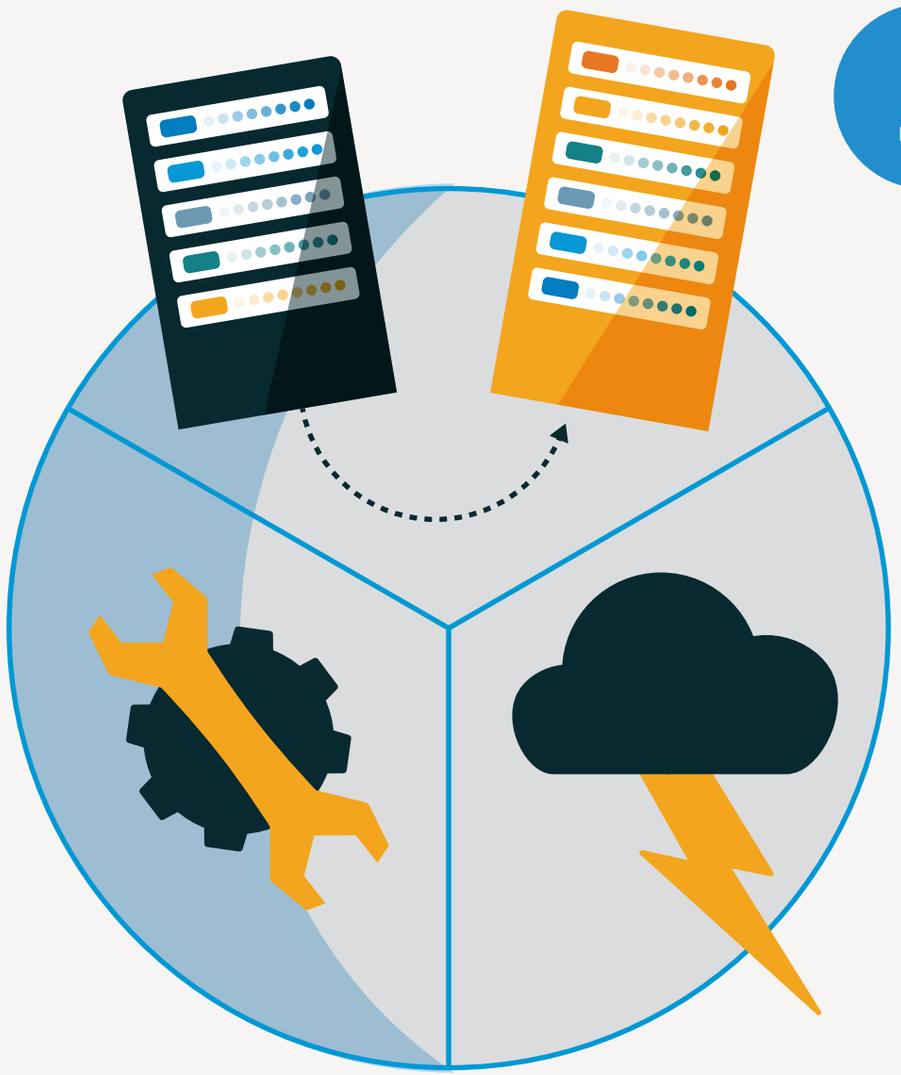
Engagement

- IANA seeks to engage its customer communities to maintain essential relationships, educate customers, gather feedback, and support their objectives one-on-one
- Our regular methods of engagement include:
  - ICANN meetings
  - IETF meetings
  - Regional RIR, NOG and TLD meetings
  - Key ceremonies
- We also support ad-hoc events, either by direct invite or supporting ICANN's broader efforts. ICANN GSE augments our engagement.
- Maintaining strong personal relationship particularly assists root zone management, where operations are supported by the trust networks it builds.

Naming Functions continued

Root Zone Management

- Managing the content of the root zone
  - Delegations in the root zone (i.e. top-level domains)
  - Ascertaining eligibility of top-level domains, and maintaining delegation data for existing top-level domains (technical changes to the root zone file itself, and administrative details regarding who manages the domain)
- Primary workflow is processing change requests:
  - Existing top-level domain operators update the data in their record
  - Prospective new operators submit delegation or transfer requests
- Secondary workflows include answering root zone related questions from community, managing root server entries.



1 Event Triggers Request

An event such as a change in TLD operator, routine maintenance (technical or staffing change) or a natural disaster triggers the need for a change request.

REGISTRY ENTRY FOR A TOP-LEVEL DOMAIN

Operator

Recognized Company or Organization

Formal Legal Name, Physical Address

Contacts

Administrative Contact

Name, Job Title,
Company, Address,
Phone, Fax, Email

Technical Contact

Name, Job Title,
Company, Address,
Phone, Fax, Email

Technical configuration

Data that goes in the root zone

Authoritative name servers
IP addresses of name servers
DNSSEC (“DS”) records

Metadata

Courtesy information not tied to operations

URL to Operator’s website, location of WHOIS service, domain converted to A-label, language etc.

Operator

Hamburg Top-Level-Domain GmbH

Gertigstrasse 28, Hamburg, 22303

Germany

Contacts

Oliver Joachim Sueme
Hamburg Top-Level-Domain GmbH
Gertigstrasse 28, Hamburg, 22303
Germany
Email: os@dothamburg.de
Voice: +49 40 27806736
Fax: +49 40 380 89 810

Martin Schlicksbier
TLD-BOX Registrydienstleistungen
Jakob-Haringer-Strasse 8
5020 Salzburg
Austria
Email: iana@tld-box.at
Voice: +43 662 2345 48730

Technical configuration

NS a.dns.nic.hamburg (194.0.25.21 2001:678:20:0:0:0:0:21)
NS b.dns.nic.hamburg (193.170.61.10 2001:62a:a:2000:0:0:0:10)
NS c.dns.nic.hamburg (193.170.187.10 2001:62a:a:3000:0:0:0:10)
DS 53866 8 2 AF2F53F6B523F31C04A741B3826D27CBAE16F4BA6F...
DS 26479 8 1 1C9F5D68C413E8A9A2C8E1C1637B8A4DA2CA6827
DS 26479 8 2 4A48334EF87D7FC156E886E5A2B2682FCF0679ED6FC...
DS 53866 8 1 D26808AE1E19086BCF5FC88D59066C3AD22F2E56

Metadata

http://www.dothamburg.de
whois.nic.hamburg

2 Change Request

A TLD operator submits a change request to IANA Department within ICANN. This is typically done through an automated web service ICANN provides called the Root Zone Management System (RZMS).

3 Policy Check

IANA checks that the change re - quest meets policy and technical requirements and confirms consent from the appropriate parties. If issues are found, IANA clarifies with the TLD operator.

Technical

- ✓ Name Servers are responding
- ✓ Name Servers return correct data that matches the request
- ✓ DNS data can be verified using the supplied DNSSEC DS records
- ✓ Supplied email addresses work

Regulatory

- ✓ Request meets legal requirements

Well-formedness

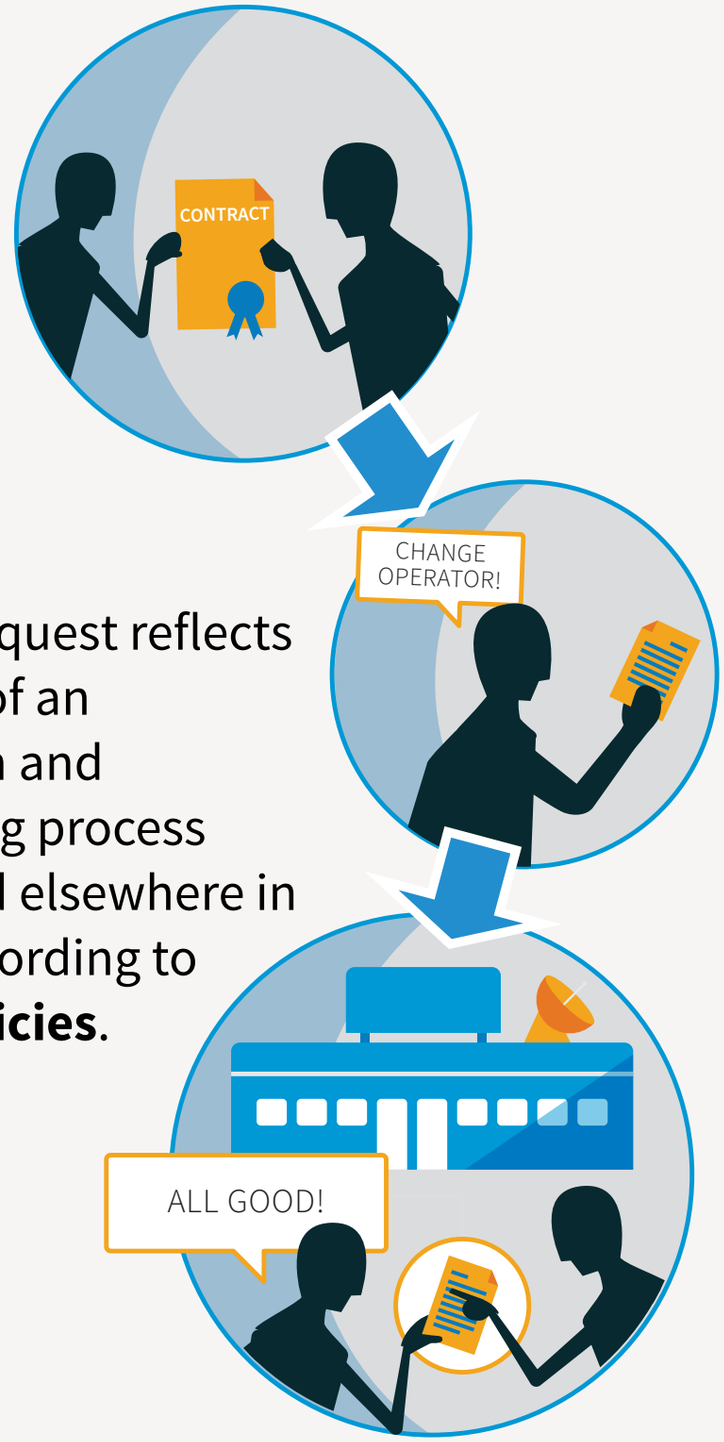
- ✓ Supplied data is clear, well-formed and consistent

Consent

- ✓ Existing contacts agree to change
- ✓ New contacts agree to their new responsibilities
- ✓ Other impacted TLDs agree

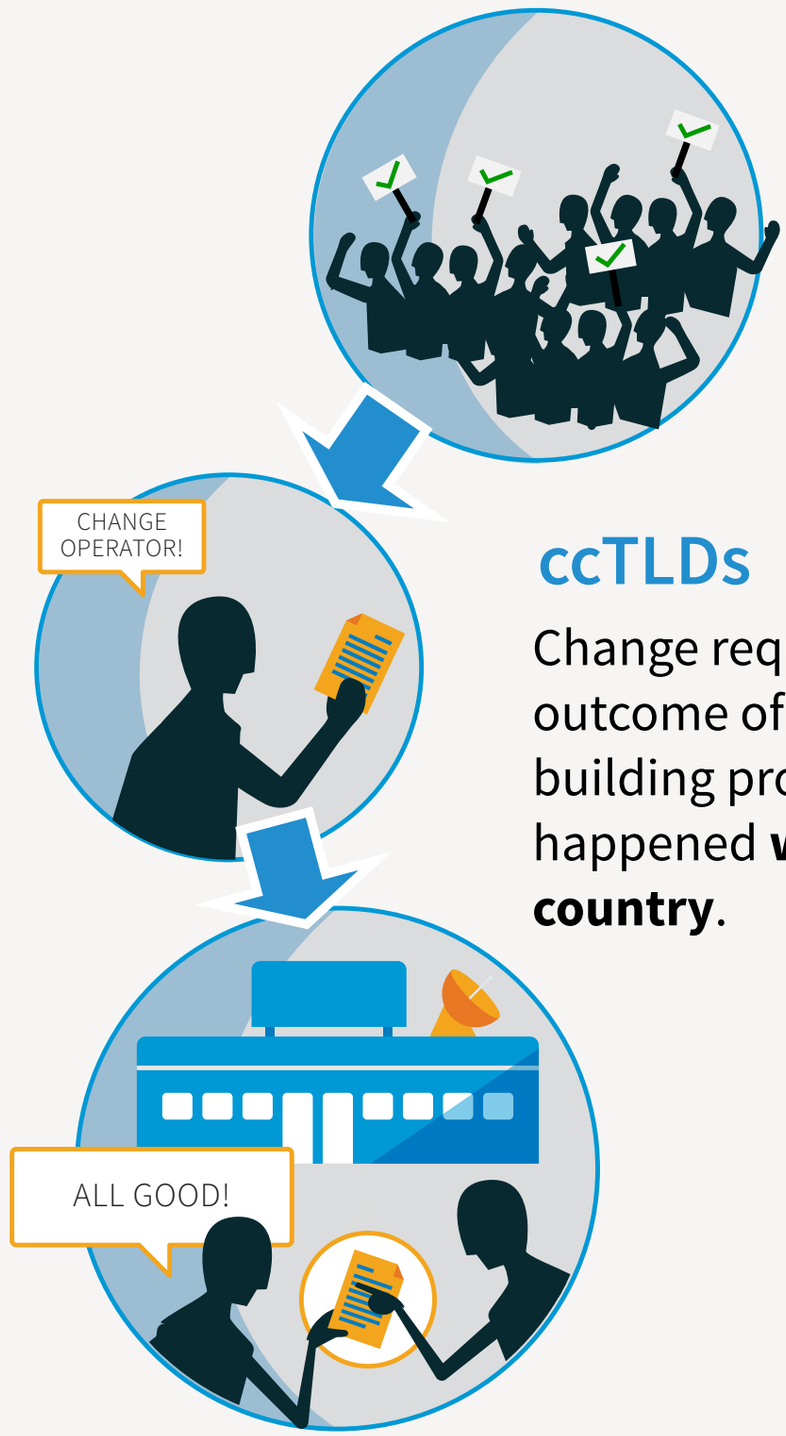
Transfer of responsibility

- ✓ Meets policy requirements for transfers (differs between ccTLDs and gTLDs)



gTLDs

Change request reflects outcome of an evaluation and contracting process conducted elsewhere in ICANN according to **GNSO policies**.



ccTLDs

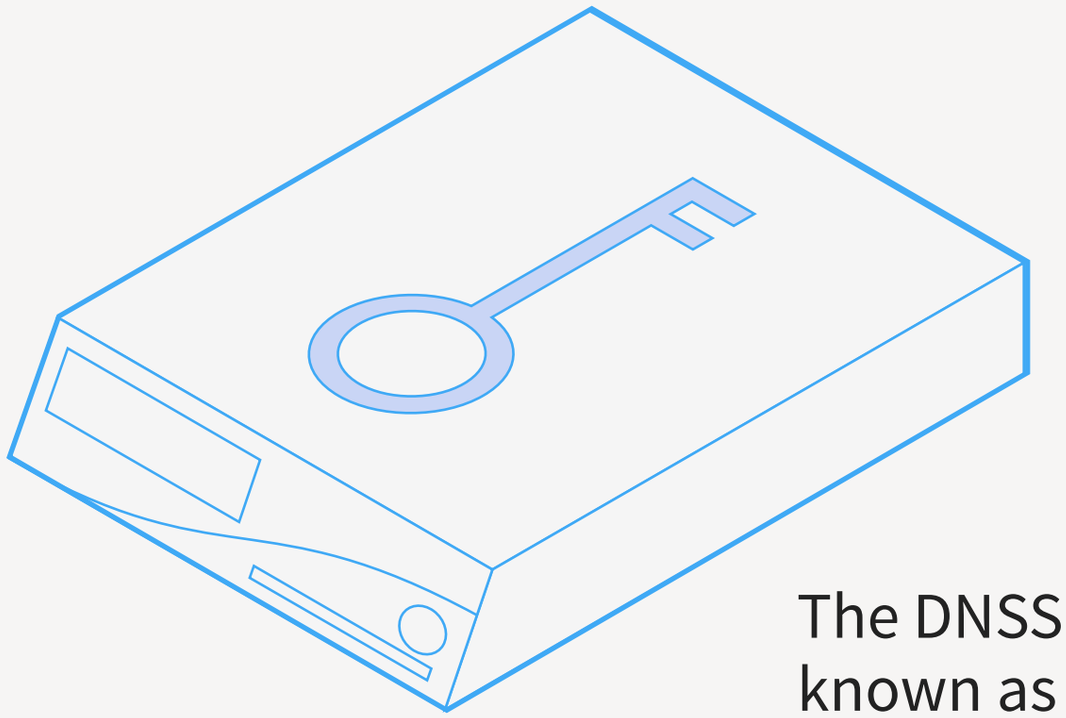
Change request reflects outcome of a consensus building process that happened **within the country**.

4 Implement changes

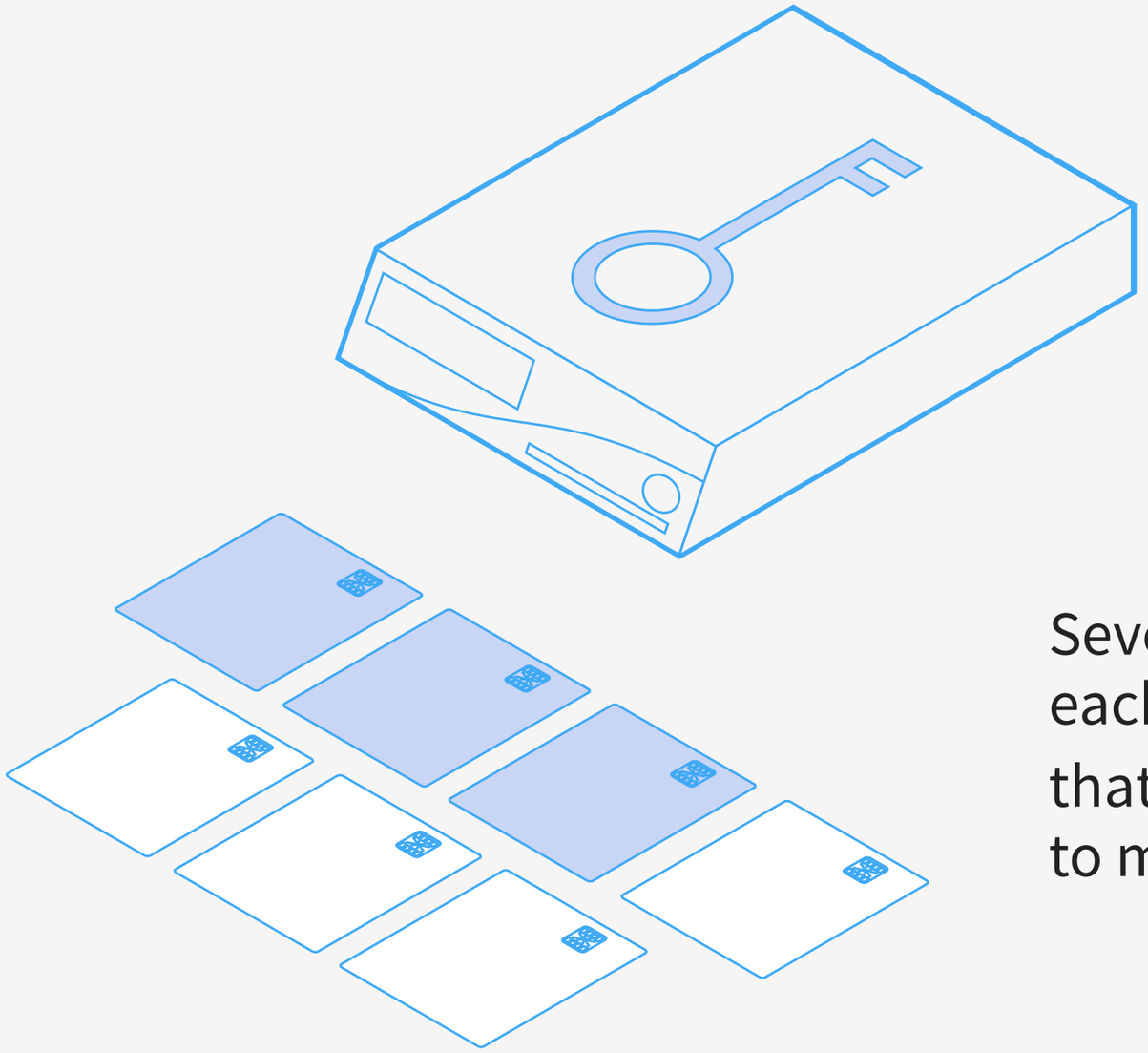
After authorization to proceed, any technical changes to the root zone are implemented. This includes applying a tamper-evident seal using DNSSEC, and distributing the updated root zone file to root server operators. The Root Zone Database is updated with the changes.

The Root Key Signing Key

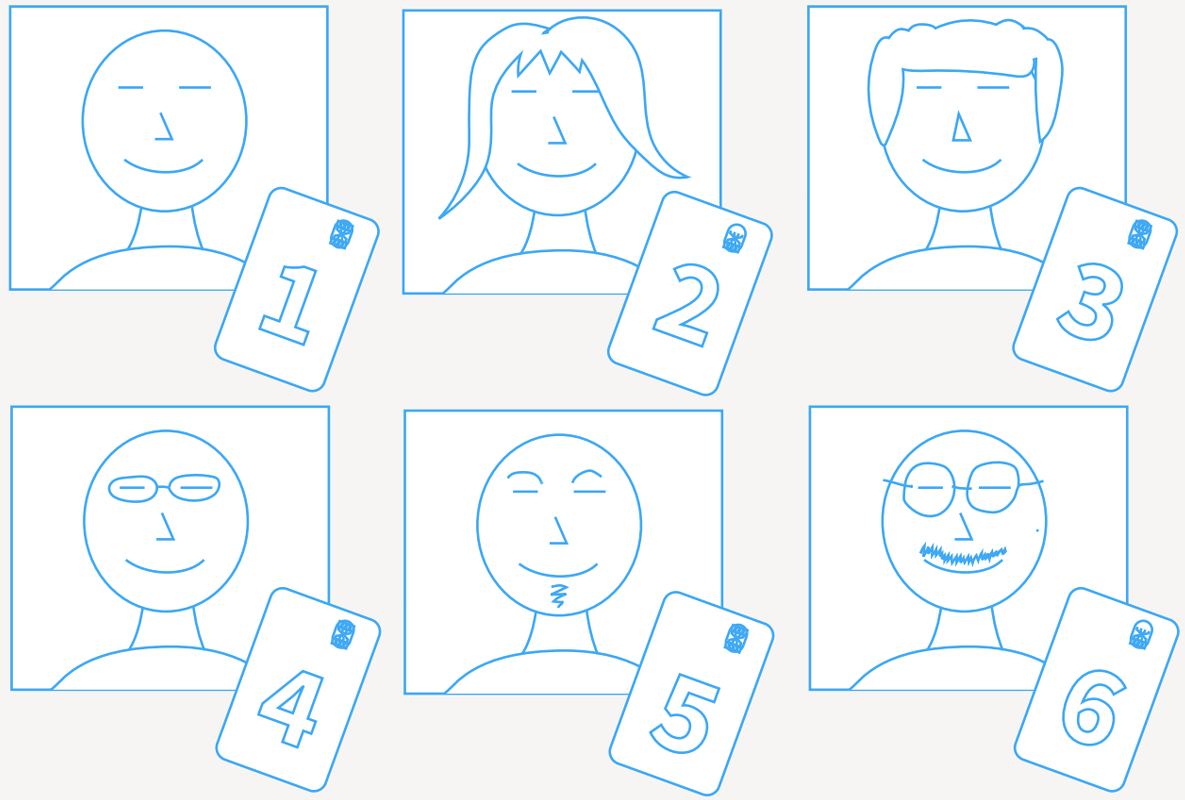
- As part of its root zone related functions, IANA manages the **key signing key**, the trust anchor used to secure the DNS with the DNSSEC protocol.
- An auditable process of performing **key signing ceremonies** to use this key is conducted using members of the community as key participants.



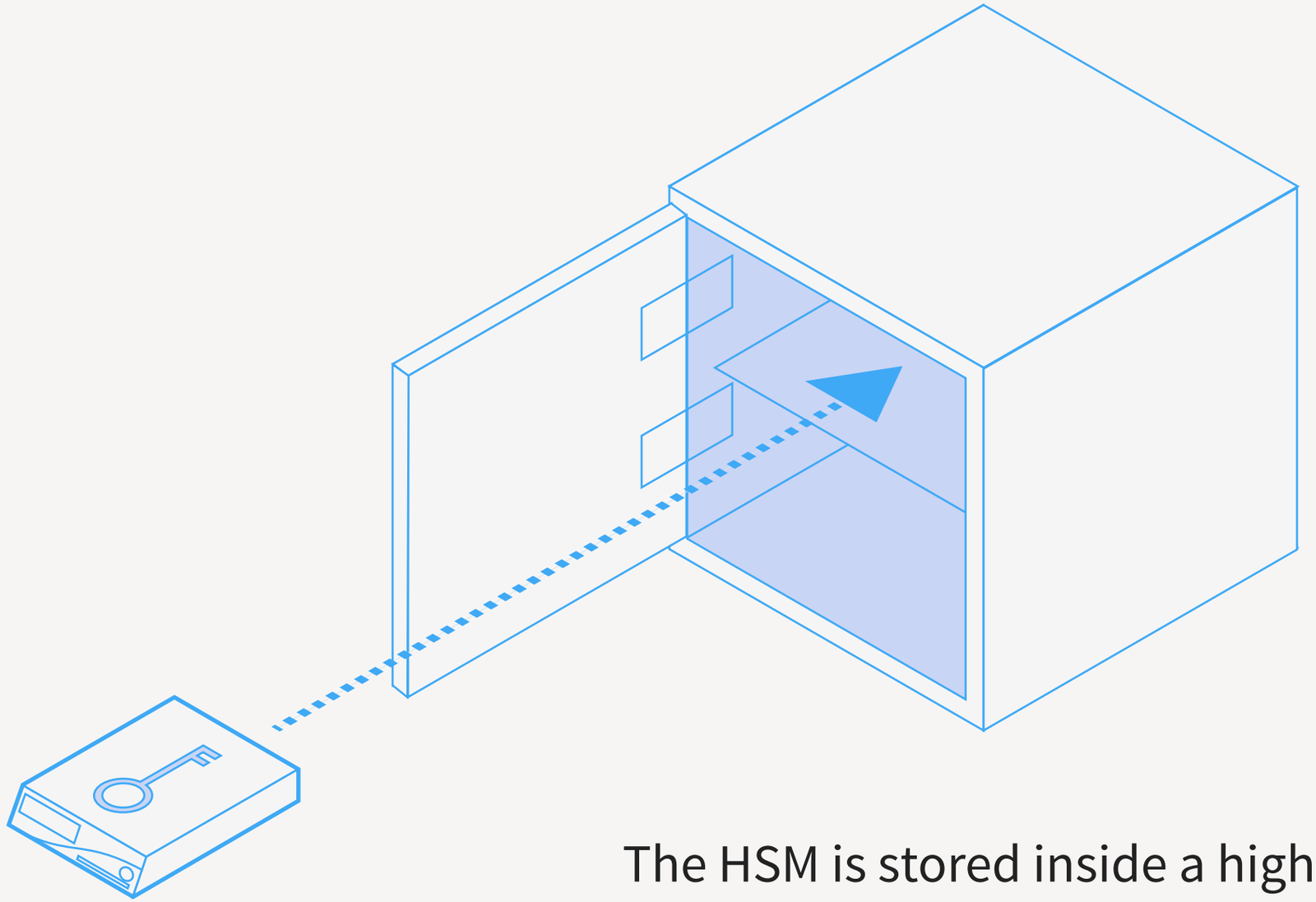
The DNSSEC root key is stored in a device known as a **hardware security module** (HSM) whose sole purpose is to securely store cryptographic keys. The device is designed to be tamper proof. If there is an attempt to open it, the contents will self-destruct.



Seven smart cards exist that can turn on each device. The device is configured such that **3 of the 7** smart cards must be present to make it useable.

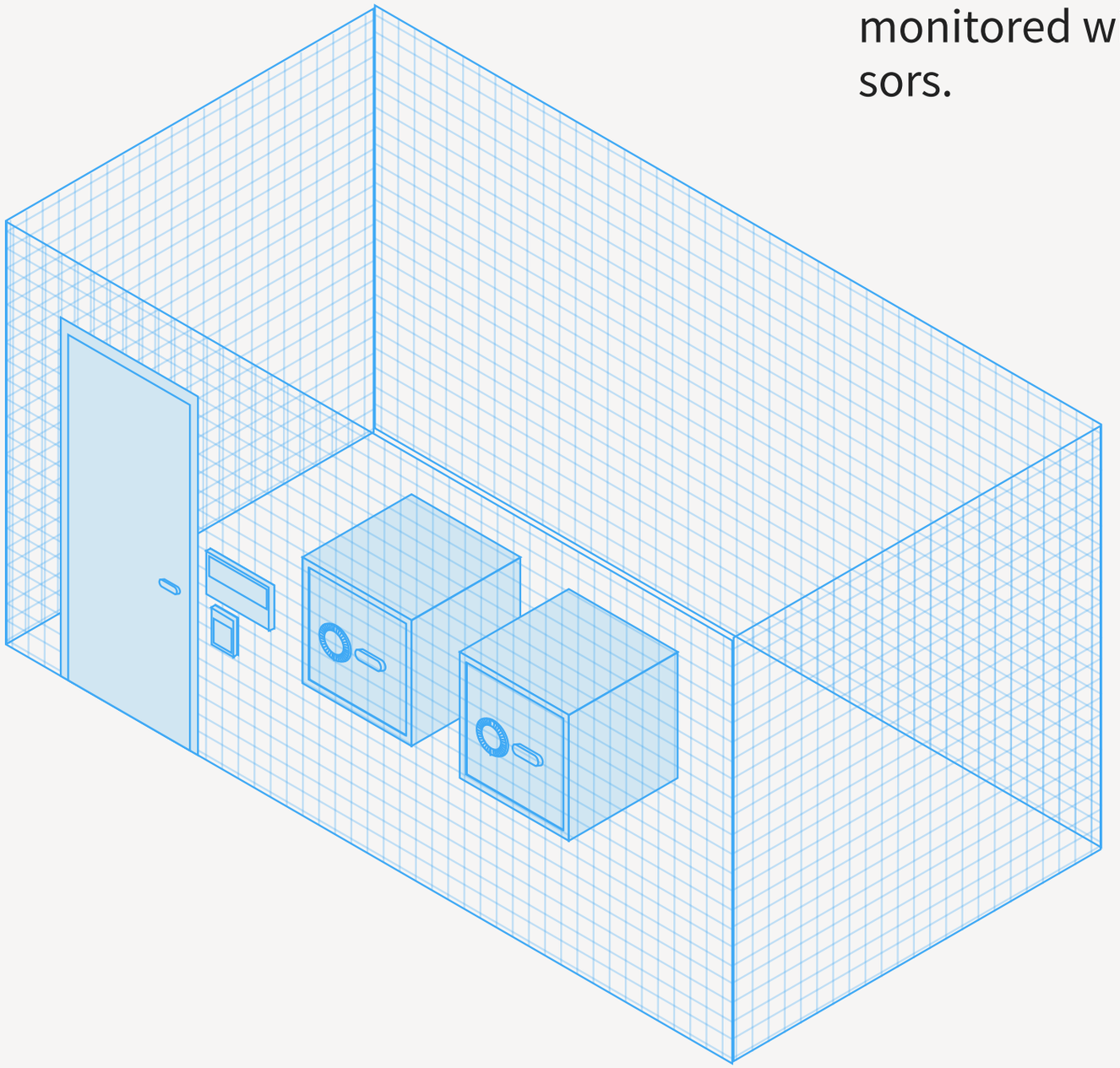


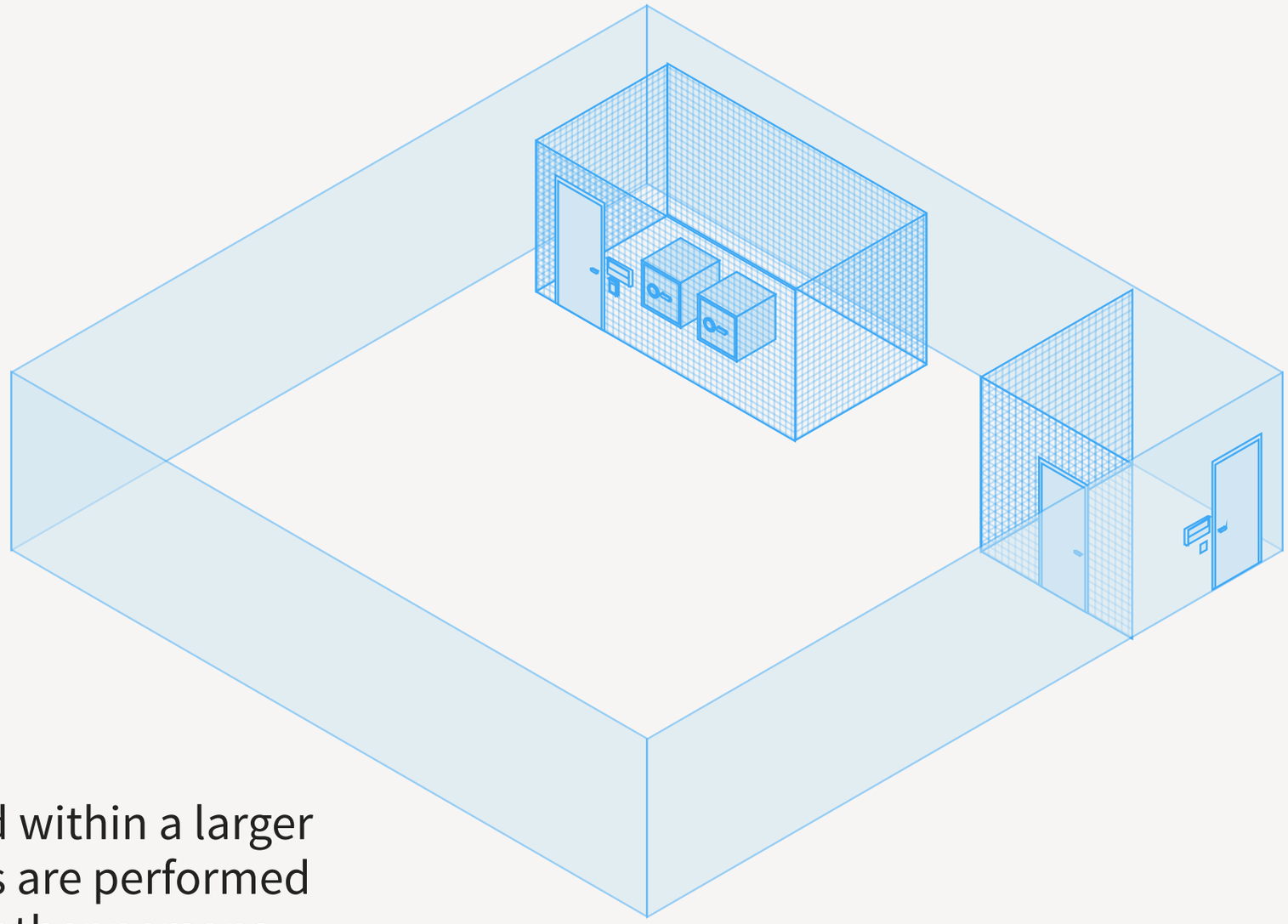
Each smart card is given to a different ICANN community member, known as a **trusted community representative**. To access the key signing key, therefore, at least three of these TCRs need to be present.



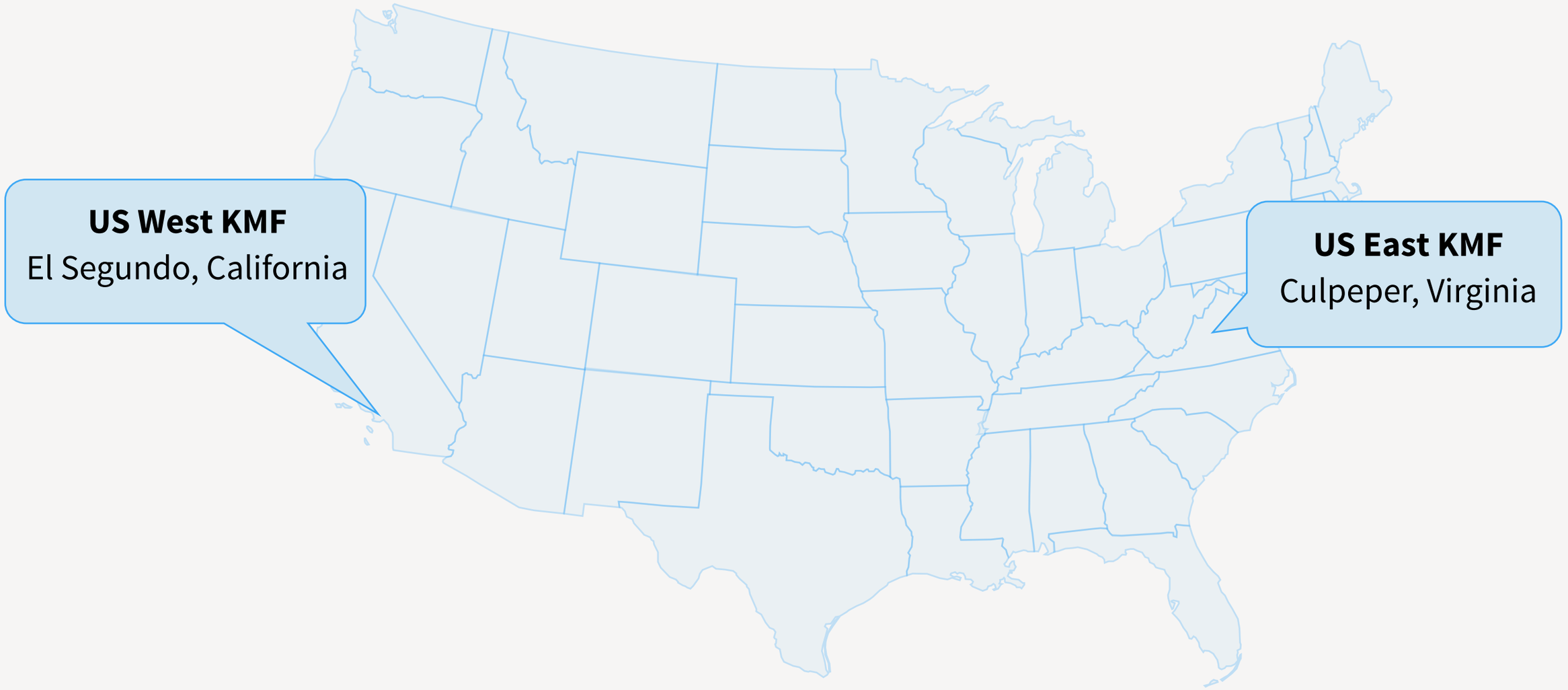
The HSM is stored inside a high-security safe, which can only be opened by a designated person, the **safe security controller**. The safe is monitored with seismic and other sensors.

The safes are stored in a secure room which can only opened jointly by two designated persons, the **ceremony administrator** and the **internal witness**. The room is monitored with intrusion and motion sensors.





The safe room is located within a larger room where ceremonies are performed involving the TCRs and other persons. Ceremonies are recorded on video, witnessed by the participants and others, and audited by a third party audit firm. Access to the room needs to be granted by another designated person, the **physical access control manager**, who is not on-site.



The ceremony rooms, known as **key management facilities**, are located within two guarded facilities, one each on the US West and East coasts.

- Approximately four times a year, the TCRs and others meet to use the HSMs to sign keys to be used for the root zone.
- The process is streamed and recorded, with external witnesses watching every step. All materials (videos, code, scripts, etc.) are posted online at **iana.org/dnssec**
- The purpose is to ensure **trust in the process**. DNSSEC only provides security if the community is confident the HSMs have not been compromised.

Key ceremony primer with interesting videos:

http://kimdavies.com/key-ceremony-primer

Trusted Community Representatives

- Act as the primary oversight mechanism from the community, provides a conduit back to their communities that the KSK is being managed appropriately.
- Selected according to a diverse array of selection criteria, balancing skills, geography and communities they represent
- 14 volunteers act as “crypto officers”, participating in the key ceremonies regularly, managing access to the 1 of 7 key shares for a specific facility
- 7 volunteers act as “recovery key share holders”, each holding a 1 of 7 key share that allows decrypting of a backup to aid in disaster recovery, but not participating in routine ceremonies.
- Approximately 10 volunteers are in a pool of “backup TCRs”, pre-vetted to be able to step into another role at short notice. These are today appointed through an SOI process: http://iana.org/tcr
- TCRs augment other oversight mechanisms, including formal 3rd party audits

Domain Names — Other functions

- .INT domains — Intergovernmental treaty organisations
- .ARPA domains — technical plumbing
- Label Generation Rulesets (LGRs, IDN tables) — registries share IDN language practices

.INT Registry

- Intergovernmental treaty organisations
- Started in 1998. Historically also included some non-treaty purposes (“international databases”) but this was phased out in 2000.
- Approximately 200 domains registered
- A small registry with very few legitimate requests per month, most are rejections for applicants that are not intergovernmental treaty organizations

.ARPA Registry

- For protocol-parameter uses, not used by end users of the Internet
- For uses prescribed by RFCs, therefore considered a protocol parameter registry in terms of oversight, not part of the naming functions

Label Generation Rulesets

- LGR Repository (formerly “IDN tables”)
- Informal repository started by ICANN staff to share best practice for IDN deployment
- Contains the definitive code points and associated eligibility rules for which strings are permitted for registration within a TLD’s policy
  - Usually language-bound (e.g. Thai, Japanese, Urdu) or script-bound (e.g. Latin, Cyrillic, Arabic, Simplified Chinese)
- Became a contractual requirement for gTLD operators (not ccTLDs) to adhere to the “IDN Guidelines”, which in turn made it a requirement to submit these as they were part of the guidelines.
- Was not an IANA function under the NTIA, but became one post-transition due to the previous point.
- No initial SLAs, but a recent review suggested they be added, new SLAs now in place with the CSC
- IANA lead development of a standard (RFC 7940) and plans to migrate to it over time

Security at IANA

- Security at IANA is more than just DNSSEC
- Dedicated workflow systems for IANA functions, independent of broader ICANN systems
- Access limited to IANA roles
- Separation of user-facing and staff-facing systems
- Strong audit culture — regular third-party audits, including independent SOC2 audit of key IANA systems

Measurement at IANA

- Measurement is a key part of our operations
- For all three areas we have comprehensive SLAs that must be reported against and explained
  - Predominant measures are time taken for business processes, availability and accuracy.
- Measurement is a key factor in identifying trends and areas for improvement
- Measurement of customer satisfactory is another facet, including annual surveys, debriefs and contemporaneous surveys after interactions.

Root Zone Maintainer

- Verisign is contracted as the “root zone maintainer”, its responsibility is to disseminate the root zone data to the root server operators
- This preserves the separation of duties that existed pre-transition. Verisign is contracted by ICANN, not PTI.
- Operationally, IANA sends off vetted and authorized root zone change deltas to Verisign via EPP for placement in the root zone. Verisign applies duplicate technical checks in order to catch any potential operational issues with the changes prior to implementation. Verisign maintains hidden distribution masters that the 12 root server operators retrieve the zone file from.
- Verisign signs the root zone using a zone signing key that they maintain, endorsed by the key signing key that IANA maintains.

Root Zone Evolution Review Committee

- RZERC is tasked with performing oversight of significant architectural changes to the root zone. Historically, NTIA took on this role to authorize major changes:
  - To implement automation in the root zone
  - To sign the root zone
- To date RZERC has largely been concerned with bootstrapping its internal processes, but has not been asked to formally review any significant architectural changes to the root zone.

Customer Standing Committee

- The Customer Standing Committee meets regularly to review month-to-month performance of the IANA naming functions.
- IANA staff provide comprehensive performance reports, and attend meetings to provide any necessary context. The committee works with a high level of collaboration.
- Over the first three years the CSC bootstrapped, including identifying and developing necessary procedures such as the Remedial Action Procedure, and SLA change process.
- Has already undergone its first effectiveness review and charter review
- Has 5 member seats (4 filled) and liaisons from other SO/ACs

Oversight Contracts and Agreements

- The IANA functions are governed by a number of different contracts and agreements, all posted at https://pti.icann.org/agreements
- For the naming function, the primary agreement is the IANA Naming Function Contract, where ICANN contracts PTI to perform these services
- The other two IANA functional areas are subcontracted to PTI, with the respective communities primarily contracting ICANN to do the work.
- Other agreements include the RZM agreement, IPR agreements.

Select active work areas pertaining to naming functions

- Developing next generation Root Zone Management System
  - Performing consultations on potential operational changes: authorization model, glue change quorum, technical check evolution
- Supporting the ccNSO/GAC work on retirement of ccTLDs
  - Ensuring the policy is workable and providing relevant context and sharing implementation consequences
- Planning future KSK rollovers
- Supporting Root Server Operators work to formalize relationships and SLAs for RSO performance

The IANA Department does

- ✓ Create registries based on policies from the community
- ✓ Maintain existing registries
- ✓ Allocate number resources
- ✓ Publish all registries for general public use

The IANA Department doesn't

- ✗ Create nor interpret policy
- ✗ Determine what can be a domain name
- ✗ Choose TLD managers

Summary

- IANA maintains the registries of unique numbering systems, that keep the Internet interoperating
- Most IANA registries are straightforward, and are not generally visible to the end-user
- High-profile, hierarchically-delegated, registries are used for the Domain Name System and Number Resources. IANA maintains the global “root” for these.
- This is a high-level introduction to a variety of topics, the IANA team is happy to explore these topics in more depth to support the work and understanding of the IFRT.

Thank you!

kim.davies@iana.org