Root Zone Domain Name System Security Extensions (DNSSEC) KSK Rollover

Ubuntu-Net Connect 2017

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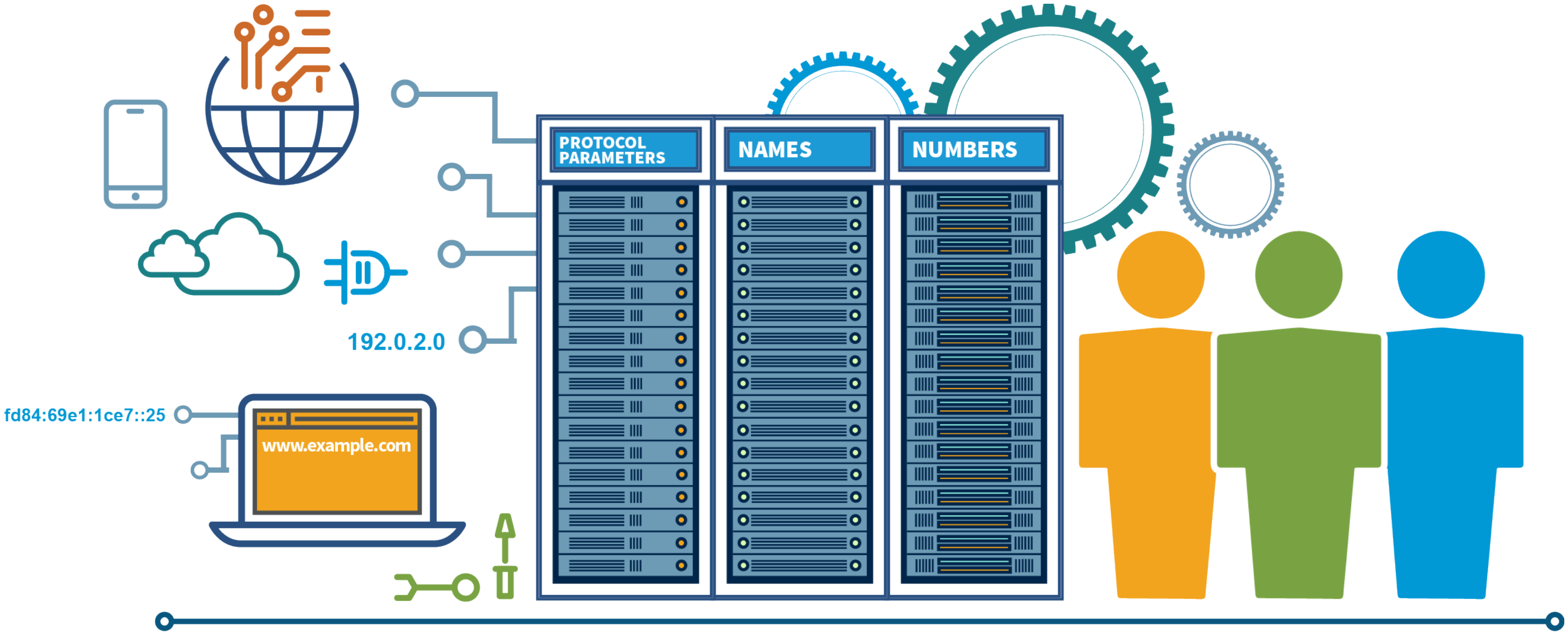
ICANN

WHAT IS ICANN?

Overview

Coordinating with our partners, we help make the Internet work.

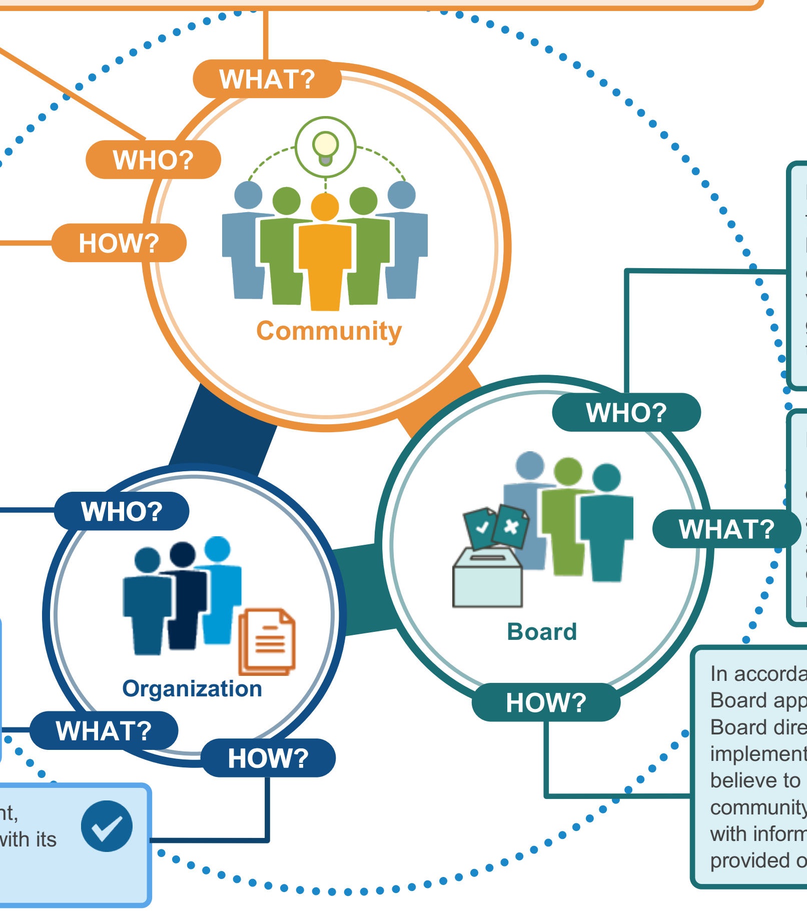


Who We Are

A volunteer-based, open collection of global stakeholders, including: businesses, Internet engineers, technical experts, civil society, governments, end users and many others.

There are three supporting organizations in the ICANN community, representing: IP addresses, generic top-level domains (gTLDs), and country code top-level domains (ccTLDs). They develop policy recommendations in their respective areas. There are four advisory committees that give advice and recommendations. These are comprised of representatives of governments and international treaty organizations; representatives of root server operators; Internet security experts and Internet end users.

Works together through a bottom-up process to give advice, make policy recommendations, conducts reviews and proposes implementation solutions for common problems within ICANN's mission and scope.



A global organization, led by the CEO with staff members in 40 countries, the ICANN organization focuses staff & resources on: policy development support, event management, registrars & registries support, Community support, contract compliance, IANA functions, outreach and capacity building, external services for the broader community (L-Root, WHOIS, etc.), & internal staff services.

The ICANN organization implements the Community's recommendations at the direction of the Board, under the supervision of the CEO, within ICANN's mission and scope.

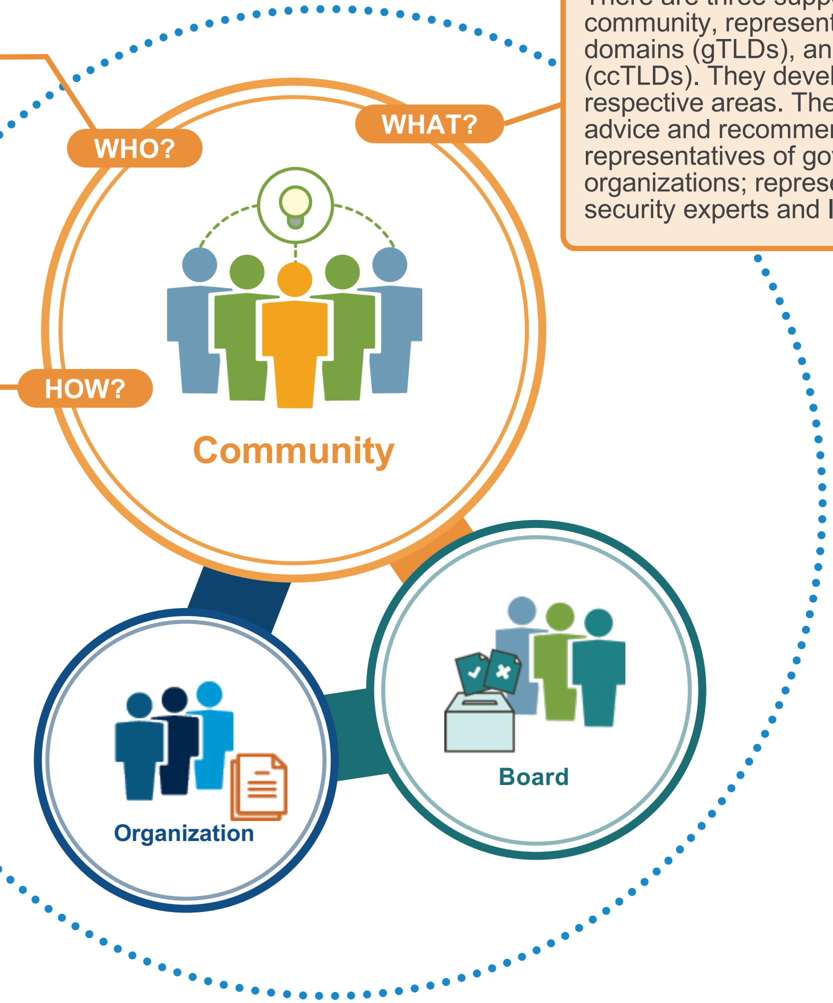
The ICANN organization is committed to accountable, transparent, inclusive and open operations and engagement, in cooperation with its partners.

Members are representatives from the Community, selected by their peers. The Board is composed of 16 members and four non-voting liaisons, from different geographies and with expertise relevant to ICANN's mission.

Provides strategic oversight for the ICANN organization, ensuring the organization acts within its mission and operates effectively, efficiently and ethically, and considers community-developed policy recommendations.

In accordance with the Bylaws, the ICANN Board approves Community policy. The Board directs the ICANN organization to implement. Board members act in what they believe to be the best interests of the global community. The Board acts by resolution, with information about decisions being provided openly and transparently.

The ICANN Community



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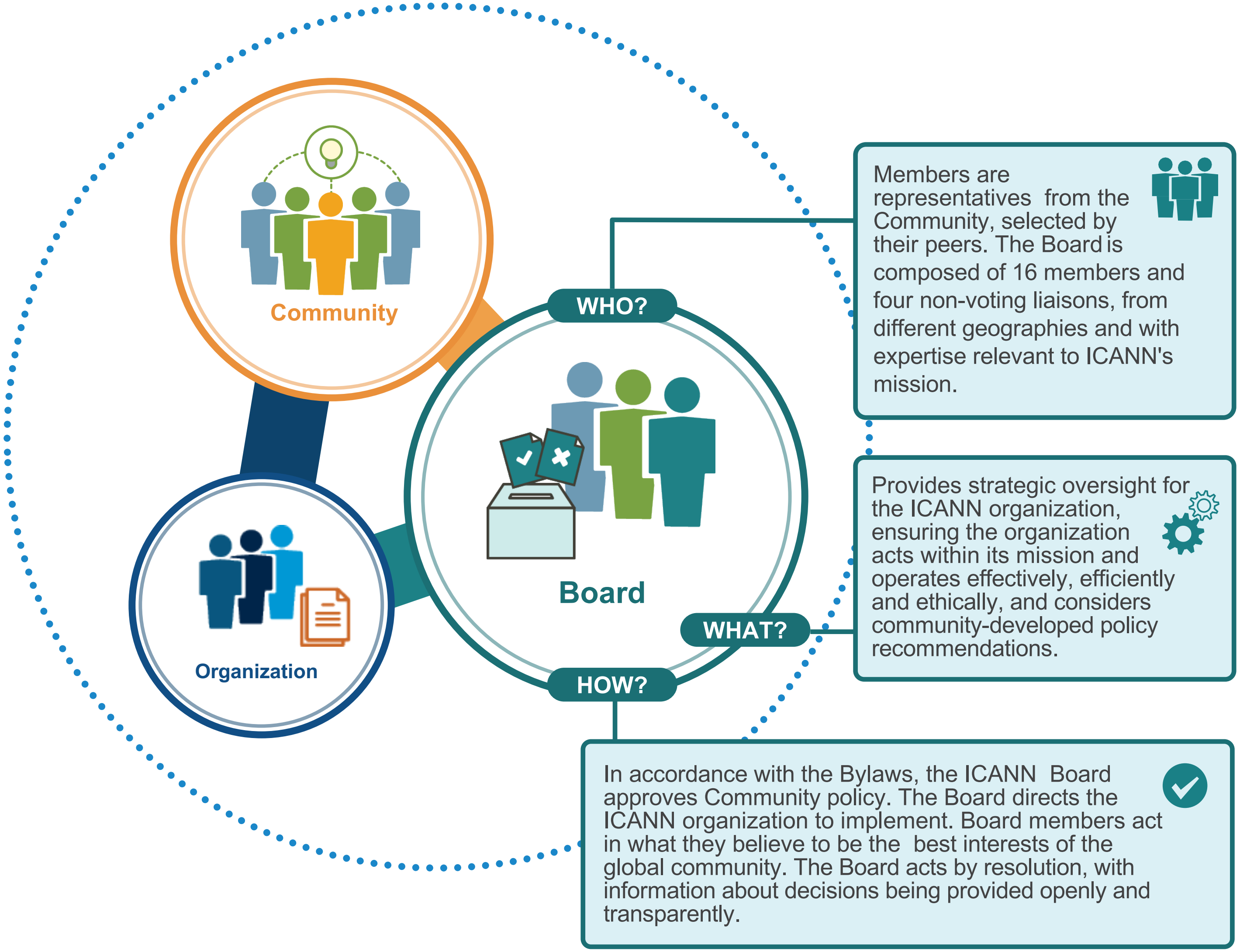

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Organization

Board

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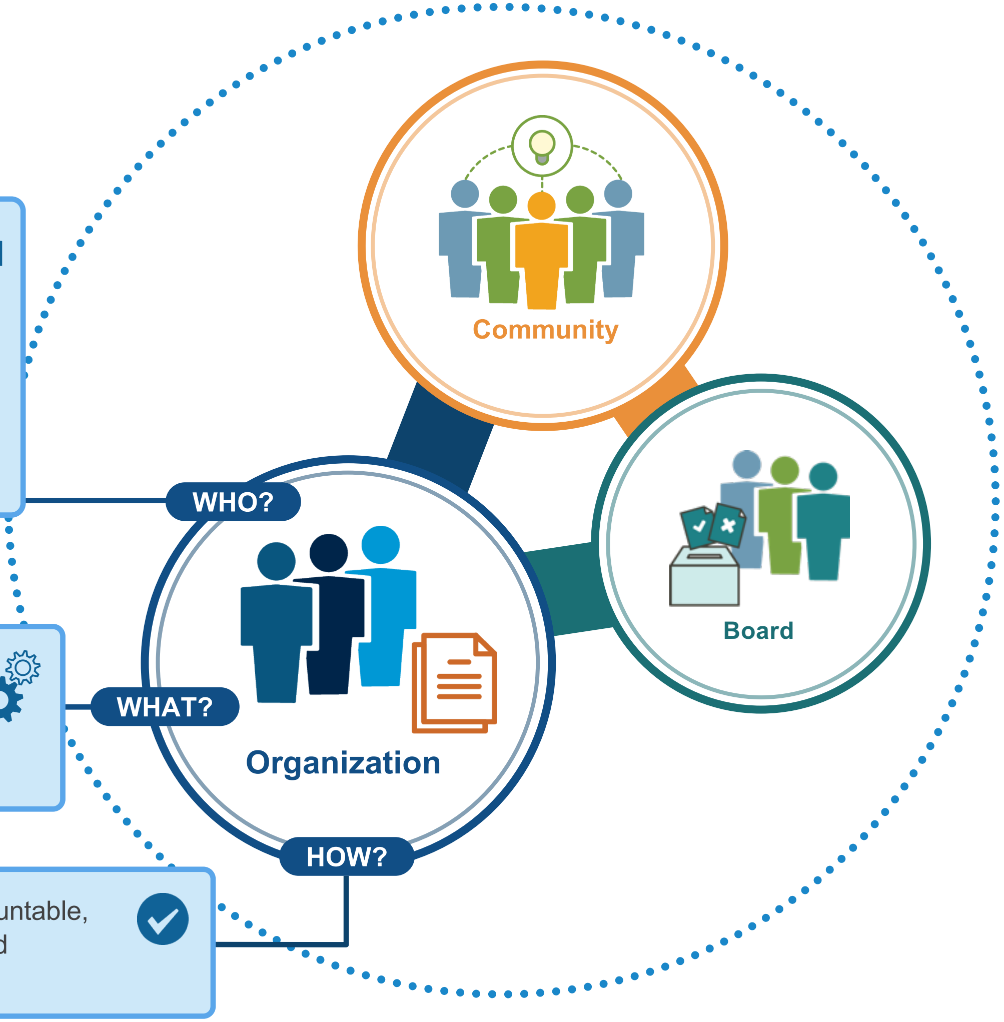
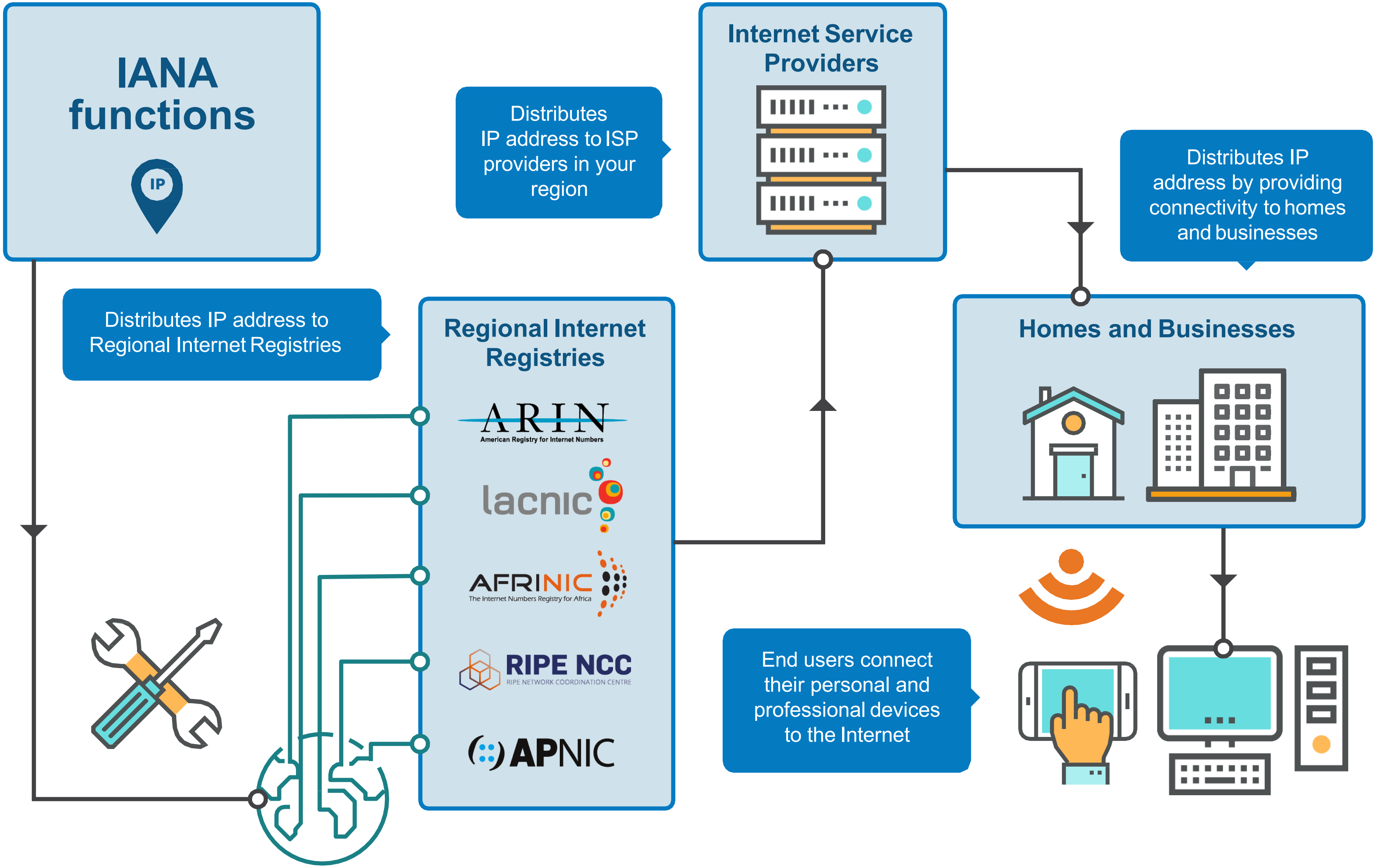


How Internet Protocol (IP) Addresses are Distributed



IANA functions

Distributes IP address to Regional Internet Registries

Regional Internet Registries

Distributes IP address to ISP providers in your region

Internet Service Providers

Distributes IP address by providing connectivity to homes and businesses

Homes and Businesses

End users connect their personal and professional devices to the Internet

IP
ARIN
American Registry for Internet Numbers
lacnic
AFRINIC
The Internet Numbers Registry for Africa
RIPE NCC
RIPE NETWORK COORDINATION CENTRE
APNIC

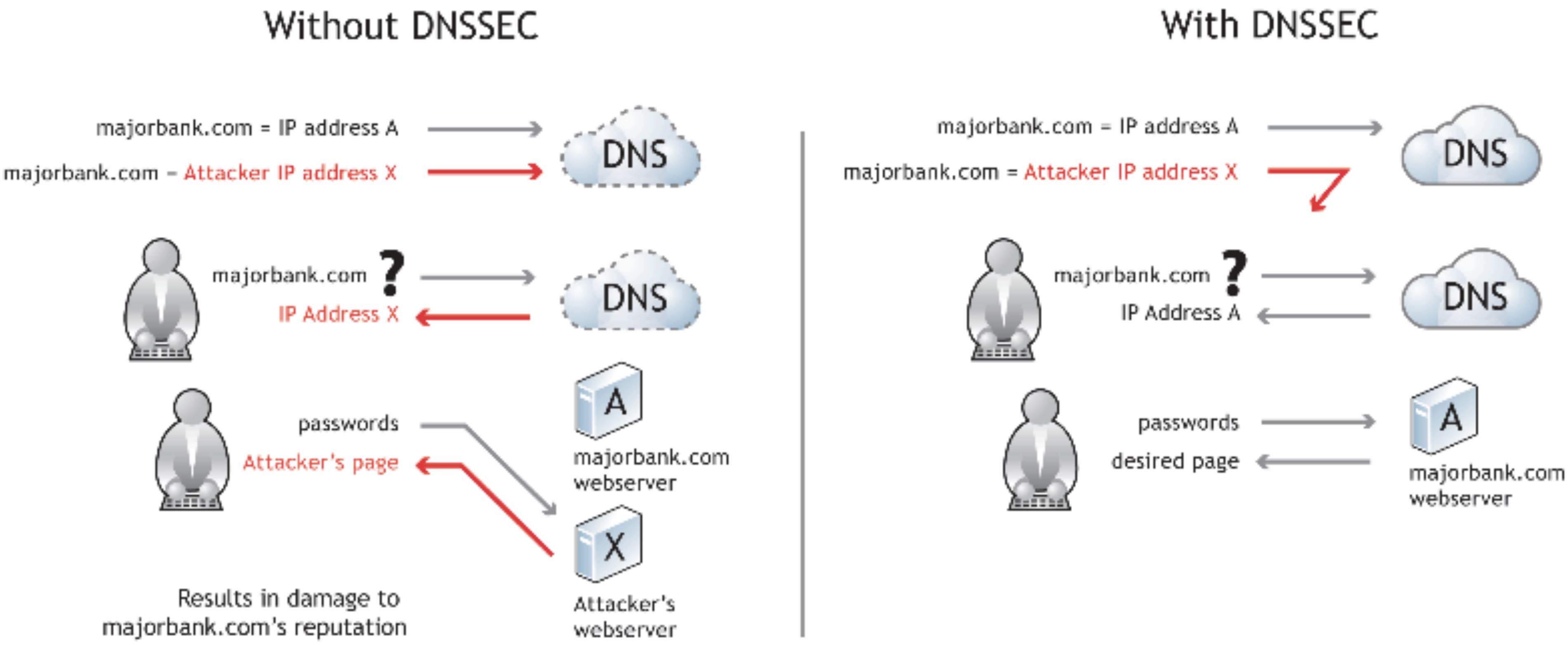
DNSSEC and KSK Rollover

DNSSEC (I)

- DNSSEC abbreviates “DNS Security Extensions.”

- DNSSEC currently being deployed to secure the Domain Name System (DNS), DNS matches each name to a numeric address

DNSSEC (II)

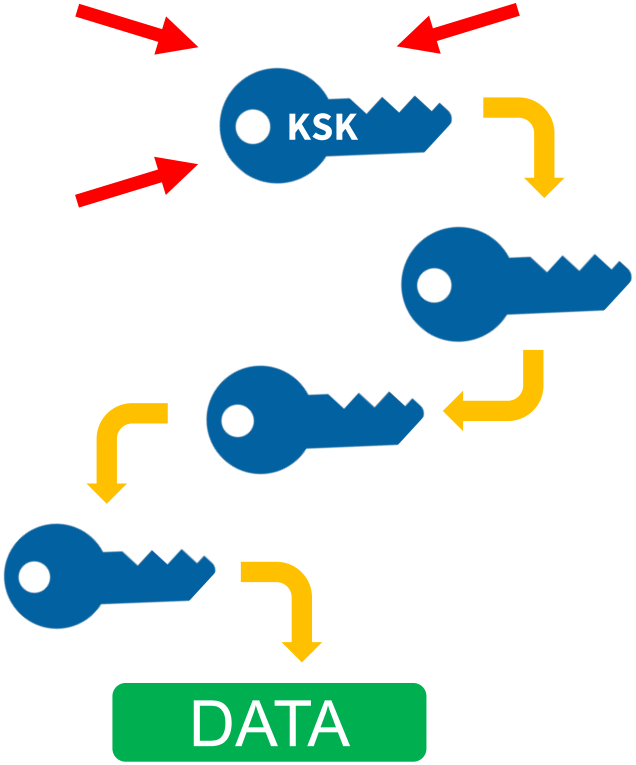


Without DNSSEC
majorbank.com = IP address A
majorbank.com = Attacker IP address X
DNS
majorbank.com ?
IP Address X
DNS
passwords
Attacker's page
A
majorbank.com webserver
X
Attacker's webserver
Results in damage to majorbank.com's reputation
With DNSSEC
majorbank.com = IP address A
majorbank.com = Attacker IP address X
DNS
majorbank.com ?
IP Address A
DNS
passwords
desired page
A
majorbank.com webserver

KSK Rollover: An Overview

ICANN is in the process of performing a Root Zone DNS Security Extensions (DNSSEC) Key Signing Key (KSK) rollover

- The Root Zone DNSSEC Key Signing Key "**KSK**" is the topmost cryptographic key in the DNSSEC hierarchy
- The KSK is a cryptographic public-private key pair:
    - Public part: trusted starting point for DNSSEC validation
    - Private part: signs the Zone Signing Key (ZSK)
- Builds a "chain of trust" of successive keys and signatures to validate the authenticity of any DNSSEC signed data



Why is ICANN Rolling the KSK?

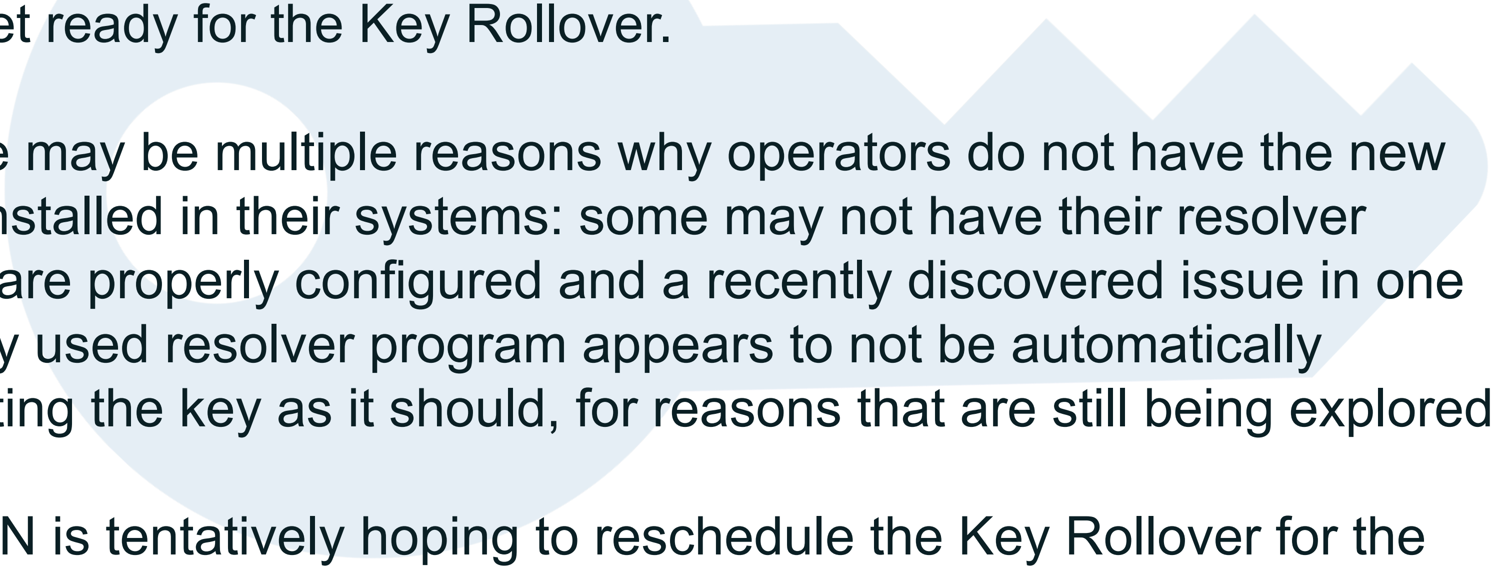
- Because it's not good for a cryptographic key to live forever. The cryptographic keys used in DNSSEC-signing DNS data should be changed periodically
    - Ensures infrastructure can support key change in case of emergency

- This type of change has never before occurred at the root level
    - There has been one functional, operational Root Zone DNSSEC KSK since 2010

- Because it's better to make proactive changes during normal operations when things are running smoothly, rather than be reactive in an emergency. The KSK rollover must be widely and carefully coordinated to ensure that it does not interfere with normal operations

DNSSEC

When Does the Rollover Take Place?



- The changing or "rolling" of the KSK Key was originally scheduled to occur on 11 October 2017, but it is being delayed because some recently obtained data shows that a significant number of resolvers used by Internet Service Providers (ISPs) and Network Operators are not yet ready for the Key Rollover.

- There may be multiple reasons why operators do not have the new key installed in their systems: some may not have their resolver software properly configured and a recently discovered issue in one widely used resolver program appears to not be automatically updating the key as it should, for reasons that are still being explored.

- ICANN is tentatively hoping to reschedule the Key Rollover for the **first quarter of 2018** and is encouraging ISPs and Network operators to use this additional time period to be certain that their systems are ready for the Key Rollover.

Who Will Be Impacted?

DNS Software Developers & Distributors

System Integrators

Network Operators

Root Server Operators

End Users

(if no action taken by resolver operators)

Why You Need to Prepare

⚠ **If you have enabled DNSSEC validation, you must update your systems with the new KSK to help ensure trouble-free Internet access for users**

- Currently, 25 percent of global Internet users, or **750 million people**, use DNSSEC-validating resolvers that could be affected by the KSK rollover

- If these validating resolvers do not have the new key when the KSK is rolled, end users relying on those resolvers will encounter errors and be **unable to access the Internet**

What Do Operators Need to Do?

Be aware whether DNSSEC is enabled in your servers

Be aware of how trust is evaluated in your operations

Test/verify your set ups

Inspect configuration files, are they (also) up to date?

If DNSSEC validation is enabled or planned in your system

- Have a plan for participating in the KSK rollover
- Know the dates, know the symptoms, solutions

How To Update Your System

If your software supports automated updates of DNSSEC trust anchors (RFC 5011):

- The KSK will be updated automatically at the appropriate time
- You do not need to take additional action
  - Devices that are offline during the rollover will have to be updated manually if they are brought online after the rollover is finished

If your software does <u>not</u> support automated updates of DNSSEC trust anchors (RFC 5011) or is not configured to use it:

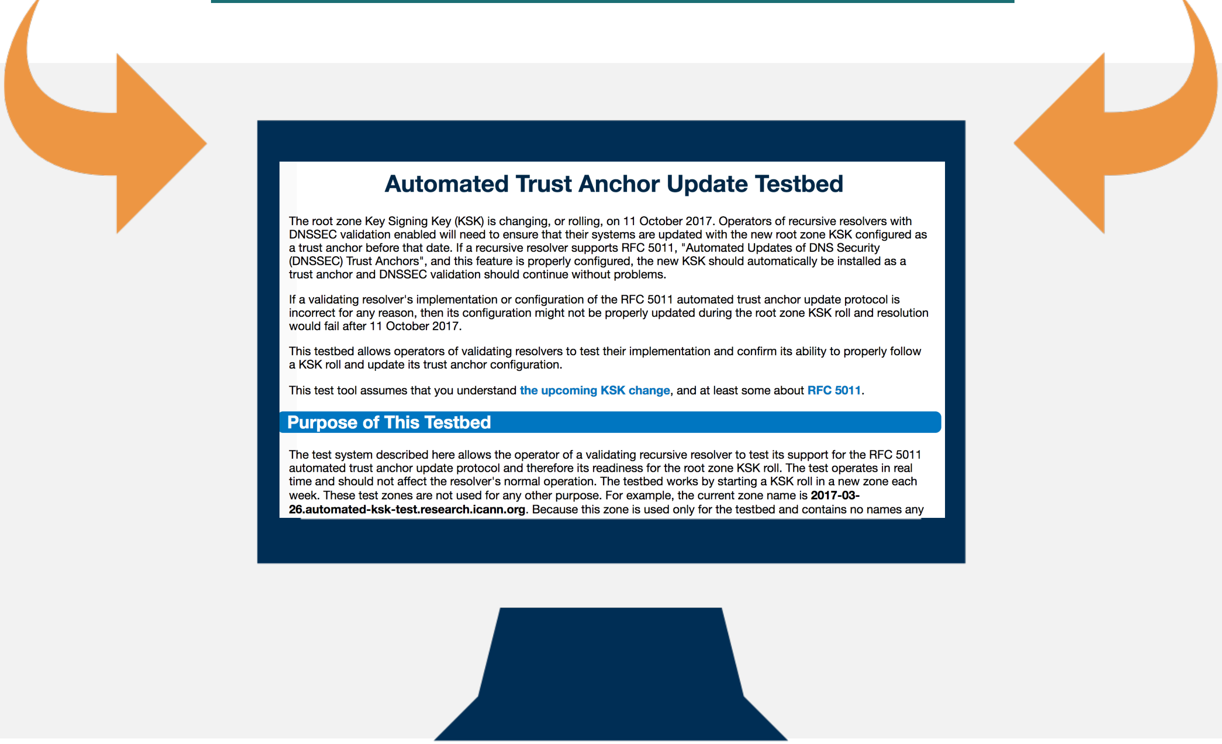
- The software's trust anchor file must be manually updated
- The new root zone KSK is now available here after March 2017:

http://data.iana.org/root-anchors/

Check to See If Your Systems Are Ready

ICANN is offering a **test bed** for operators or any interested parties to confirm that their systems handle the automated update process correctly.

Check to make sure your systems are ready by visiting:
go.icann.org/KSKtest



Automated Trust Anchor Update Testbed

The root zone Key Signing Key (KSK) is changing, or rolling, on 11 October 2017. Operators of recursive resolvers with DNSSEC validation enabled will need to ensure that their systems are updated with the new root zone KSK configured as a trust anchor before that date. If a recursive resolver supports RFC 5011, "Automated Updates of DNS Security (DNSSEC) Trust Anchors", and this feature is properly configured, the new KSK should automatically be installed as a trust anchor and DNSSEC validation should continue without problems.

If a validating resolver's implementation or configuration of the RFC 5011 automated trust anchor update protocol is incorrect for any reason, then its configuration might not be properly updated during the root zone KSK roll and resolution would fail after 11 October 2017.

This testbed allows operators of validating resolvers to test their implementation and confirm its ability to properly follow a KSK roll and update its trust anchor configuration.

This test tool assumes that you understand the upcoming KSK change, and at least some about RFC 5011.

Purpose of This Testbed

The test system described here allows the operator of a validating recursive resolver to test its support for the RFC 5011 automated trust anchor update protocol and therefore its readiness for the root zone KSK roll. The test operates in real time and should not affect the resolver's normal operation. The testbed works by starting a KSK roll in a new zone each week. These test zones are not used for any other purpose. For example, the current zone name is **2017-03-26.automated-ksk-test.research.icann.org**. Because this zone is used only for the testbed and contains no names any

Three Steps to Recovery

If your DNSSEC validation fails after the key role:

Stop the tickets

It's OK to turn off DNSSEC validation while you fix (but remember to turn it back on!)

Debug

If the problem is the trust anchor, find out why it isn't correct

- Did RFC 5011 fail? Did configuration tools fail to update the key?
- If the problem is fragmentation related, make sure TCP is enabled and/or make other transport adjustments

Test the recovery

Make sure your fixes take hold

For More Information

1 **Visit https://icann.org/kskroll**

2 **Join the conversation online**

- Use the hashtag #KeyRoll
- Sign up to the mailing list https://mm.icann.org/listinfo/ksk-rollover

3 **Ask a question to globalsupport@icann.org**

- Subject line: “KSK Rollover”

4 **Attend an event**

- Visit https://features.icann.org/calendar to find upcoming KSK rollover presentations in your region