



KINDNS

A Framework to Improve Secured DNS Operations

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Agenda

1. KINDNS presentation
2. Demo
3. Q/R session

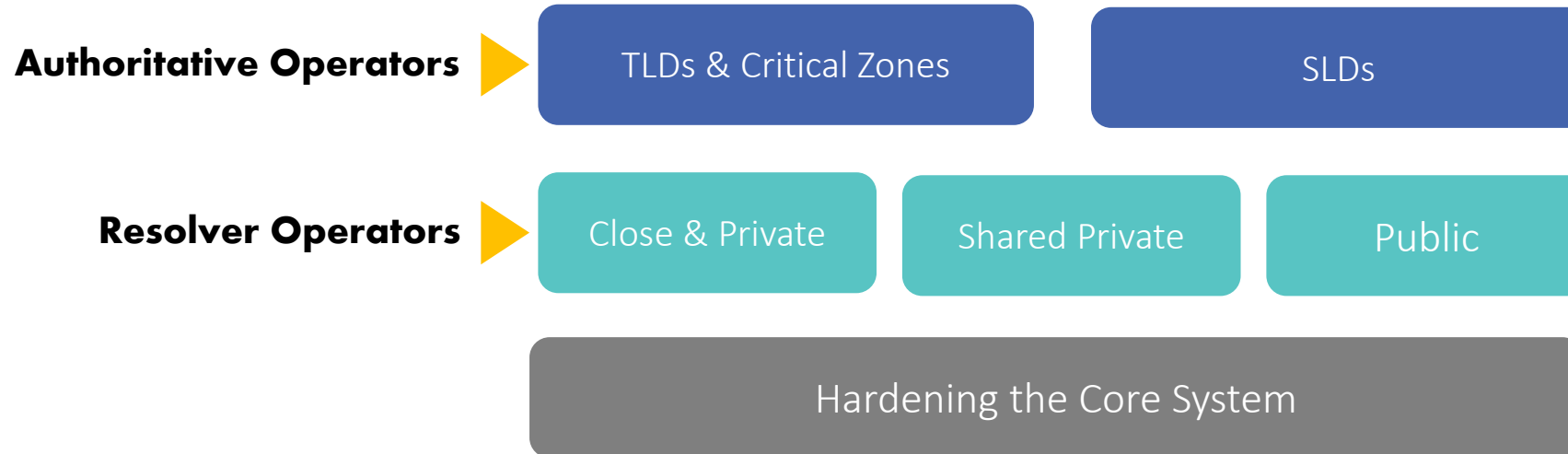
What Is It?

Knowledge-sharing and Instantiating **N**orms for **D**NS
(Domain Name System) and **N**aming **S**ecurity

*A simple framework that can **help a wide variety of DNS operators**, from small to large, to follow both the **evolution of the DNS** protocol and the best practices that the industry identifies for better security and more effective DNS operations.*

..... is pronounced "**kindness**"

Targeted Operators



Each category has 6-8 practices that we encourage operators to implement.

See www.kindns.org, for more details.

Authoritative DNS Operators of Critical Zones

TLDs & Critical Zones

1. **MUST** be DNS Security Extensions (DNSSEC) signed and follow key management best practices.
2. Transfer between authoritative servers **MUST** be limited
3. Zone file integrity **MUST** be controlled
4. Authoritative and recursive nameservers **MUST run on separate infrastructure**
5. A minimum of two distinct nameservers **MUST** be used for any given zone
6. There **MUST** be diversity in the operational infrastructure: **Network, Geographical, Software**
7. The infrastructure that makes up your DNS infrastructure **MUST** be monitored

Authoritative DNS Operators of SLDs

SLDs

1. **MUST** be DNSSEC signed and follow key management best practices
2. Transfer between authoritative servers **MUST** be limited
3. Zone file integrity **MUST** be controlled
4. Authoritative and recursive nameservers **MUST run on separate infrastructure**
5. A minimum of two distinct nameservers **MUST** be used for any given zone
6. Authoritative servers for a given zone **MUST** run from diversified infrastructure
7. The infrastructure that makes up your DNS infrastructure **MUST** be monitored

Closed & Private Resolver Operators

Private resolvers are not publicly accessible and cannot be reached over the open internet. They are typically found in corporate networks or other restricted-access networks

Closed & Private resolvers

1. DNSSEC validation **MUST** be enabled
2. Access control list (ACL) statements **MUST** be used to restrict who may send recursive queries
3. QNAME minimization **MUST** be enabled
4. Authoritative and recursive nameservers **MUST** run on separate infrastructure
5. At least two distinct servers **MUST** be used for providing recursion services
6. Authoritative servers for a given zone **MUST** run from a diversified Infrastructure
7. The infrastructure that makes up your DNS infrastructure **MUST** be monitored

All practices are well documented there!



[Home](#) [About](#) [Operator Categories](#) [Support & Engage](#) [Tools & Guidelines](#) [News](#) [Events](#)



Stands for Knowledge-Sharing and Instantiating Norms for DNS and Naming Security.

It's a program supported by ICANN to develop and promote a framework that focuses on the most important operational best practices or concrete instances of DNS security best practices.

[JOIN US](#)

[SELF-ASSESSMENT](#)

An **ICANN**
Initiative



<https://kindns.org/guidelines/>

[Assessment & Tools](#)

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[Guidelines](#) >

[DNS Security Resources](#)

[Critical Zones & TLD Operators](#)

[Other SLD Operators](#)

[Private Resolver Operators](#)

[Shared Private Resolver Operators](#)

[Public Resolver Operators](#)

[Core Platform/System Hardening](#)

[Additional Information](#)



Self-assessment & Enrollment

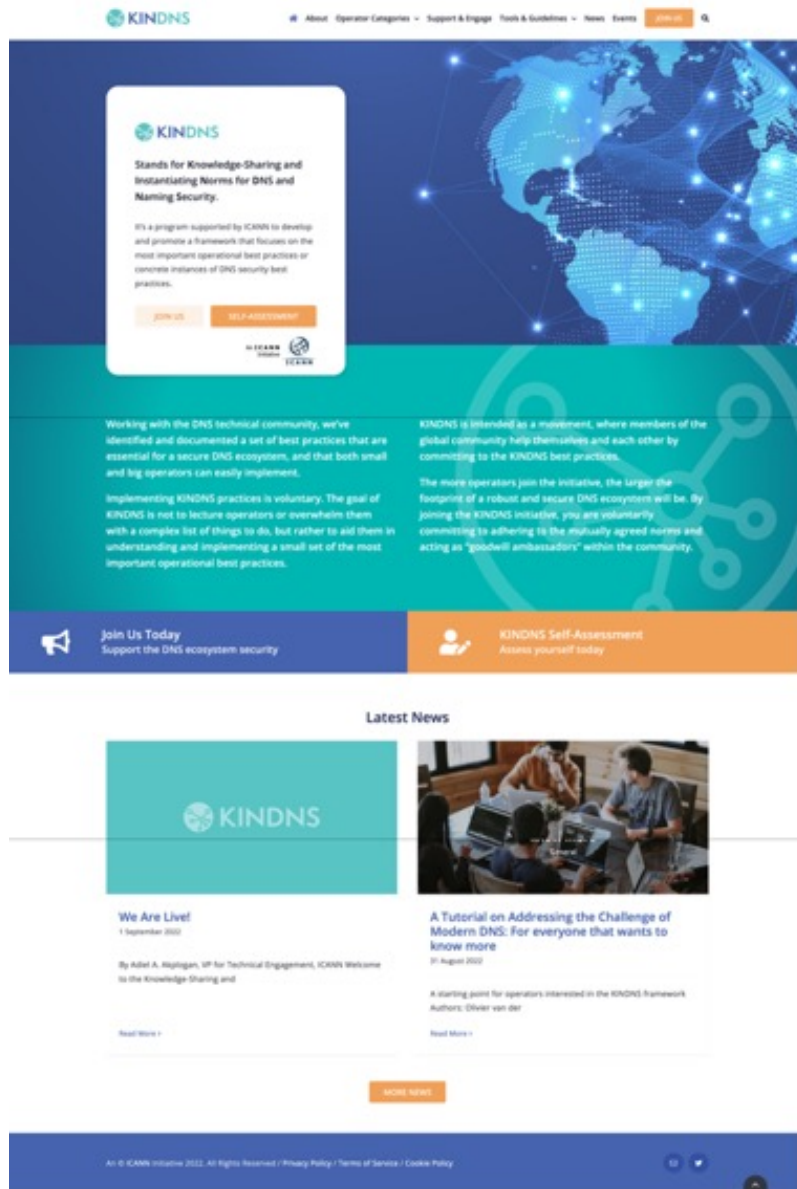
Operators in each category can self-assess their operational practices against KINDNS and use the report to correct/adjust unaligned practices.

- self-assessment is anonymous
- reports can be downloaded directly from the web site.

Operators can enroll as participant to one or many categories covered by KINDNS.

- Participation in the KINDNS initiative means voluntarily committing to implement/adhere to agreed practices.
- Participants become goodwill ambassadors and promote best practices.

Website – <https://kindns.org/>



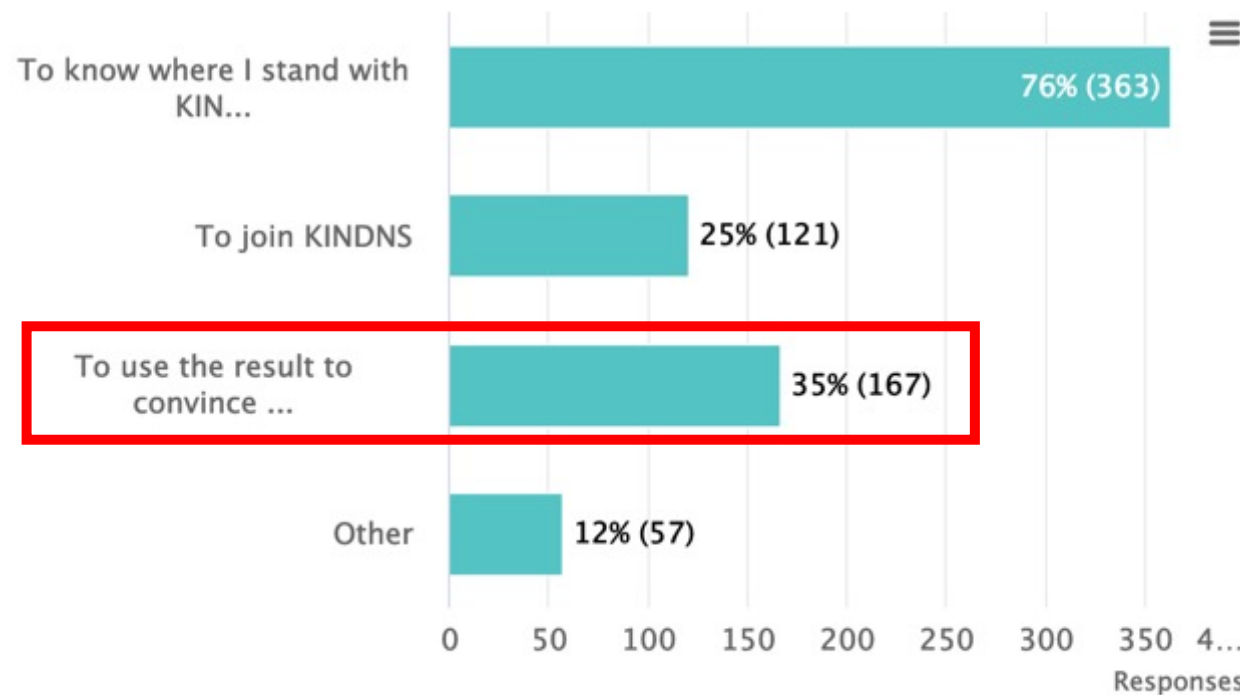
Self-Assessment Report



Early Observations

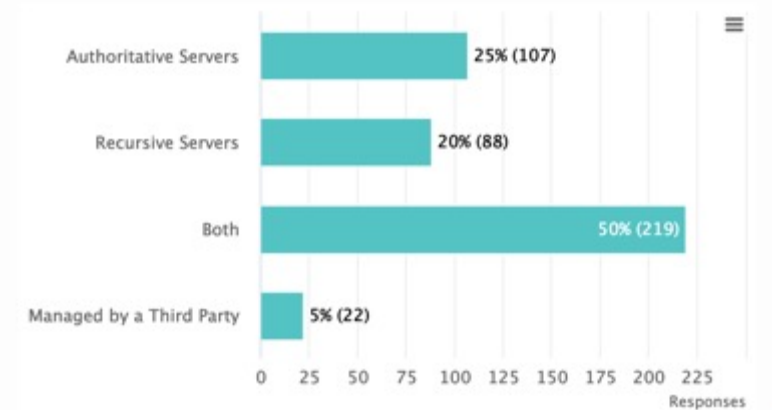
Why are you taking this self-assessment?

Bar chart ▾



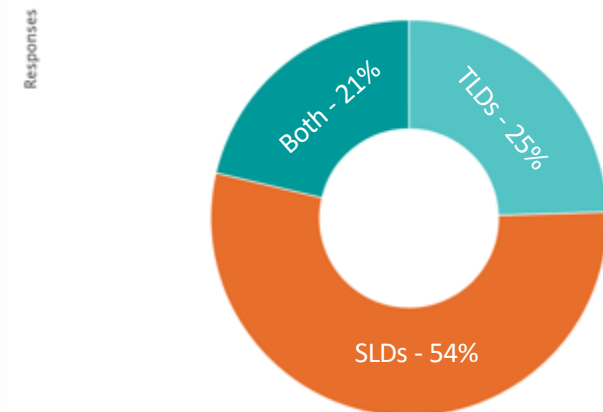
Part 1 Core DNS Operation Practices Assessment – Which component(s) of the DNS do you run?

Bar chart ▾

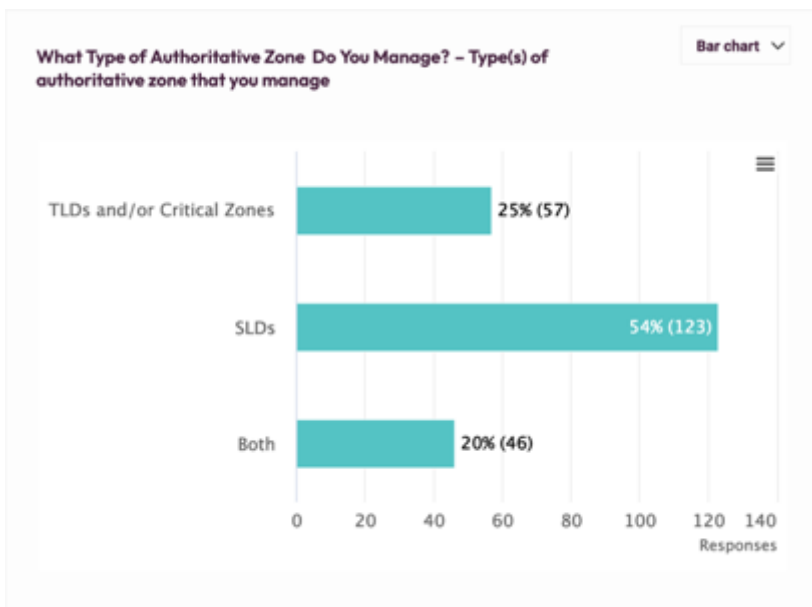


What Type of Authoritative Zone Do You Manage? – Type(s) of authoritative zone that you manage

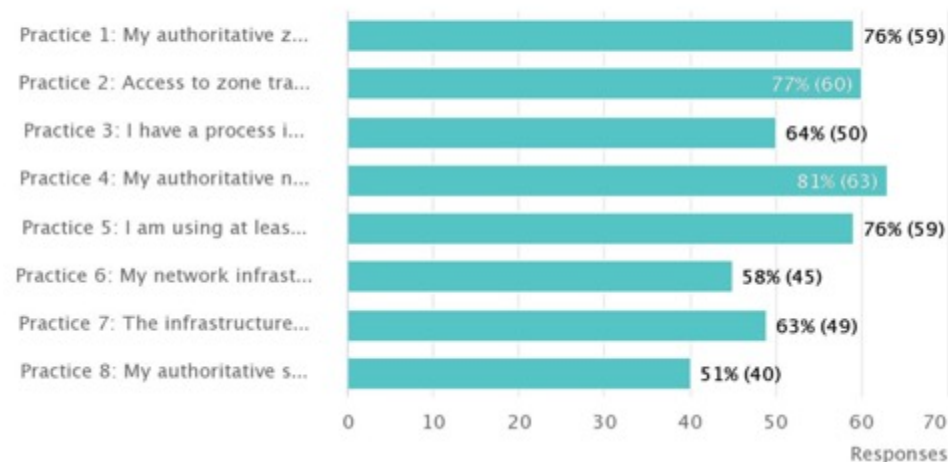
Donut chart ▾



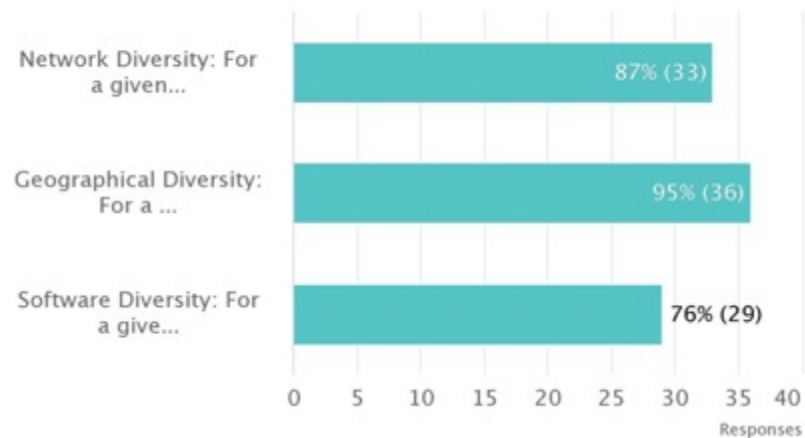
Early Observations (con't)



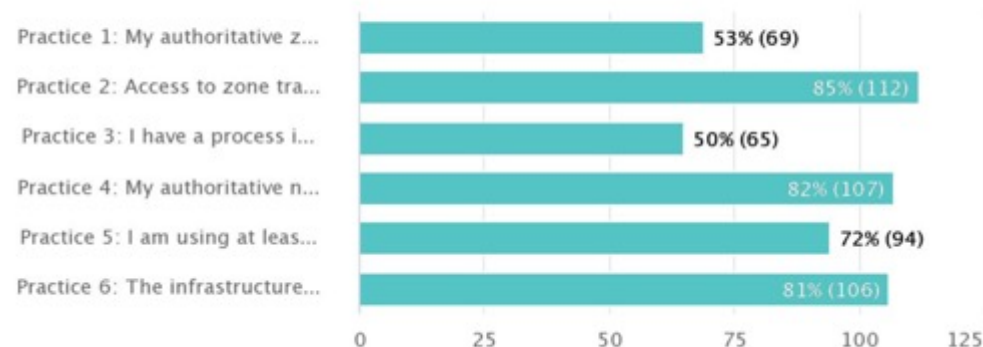
As Authoritative Nameserver manager for one or more TLDs or Critical Zones, I implement and adhere to the following practices:



Can you tell us more about your operational diversity practices?



As operator of Authoritative Nameserver(s) for one or more Second Level Domains (SLDs), I implement and adhere to the following practices:



Selecting BCPs

How do we identify them ?

- Draw from own operational experience
- Ask operators (NOG lists, communities)
- Review RFCs and other standards
<https://powerdns.org/dns-camel/>
- Shortlist based on relevance, ease of implementation, and how widespread the adoption is

Ask operators to review the selection ([kindns-discuss](#))

Debate and justify choices

Engaging the community

Operators must agree on the selected BCPs

kindns-discuss list launched in 2021

- Encouraged operators from all backgrounds to join
- When in doubt, we asked community for advice on what they consider to be a BCP or not
- Some things were debated – is DNSSEC validation a **MUST** nowadays ? (We think so 😊)
- Some practices weren't implemented widely enough, or too complicated (not low hanging fruit) for small operators
 - e.g. Anycast

Current Focus: Phase 2

Service Platform Hardening

◎ Front-end

- Re-Activate the full **enrollment form**
- **Translate** the website and the tools into other languages
- **Evolve the Self-assessment** tool to technically measure/assess how operators implement the practices.
 - Two views: Internal & External
 - Ability to measure implementation by collecting anonymized data from the self-assessment tool.
 - Integrate a Zonemaster version for Authoritative servers

◎ Back-end

- *Integrate the KINDNS server to ICANN E&I monitoring service*
- *Implement a ticketing system to better track interactions with the public.*
- *Improve the security fence around WordPress*
- *Deploy an integrated enrollment management tool (a WP plugin)*
- *Renew ICANN infosec assessment.*
- *Directly link self-assessment to enrollment*
- *Develop an integrated tool to simplify/automate Operator compliance assessment*

Current Focus: Phase 2 (con't)

Community Engagement

- ⊙ **Community engagement:** continue to encourage operators to get onboard to **contribute and support** the framework:
 - *Direct 1:1 Engagements*
 - *Convince/Encourage more DNS operators to join*
 - *Workshops & webinars to raise awareness on KINDNS practices as part of our overall DNS ecosystem security awareness program.*
 - *DNSAthons around secure DNS operations*
 - *Develop partnerships with programs such as MANRS and Pulse, internet.nl, etc.*
- ⊙ **Communication:** a more active communication plan to further promote KINDNS
 - *Publish a series of DNS best practices dedicated blogs*
 - *Develop toolkits to help operators engage with internal decision-makers.*

KINDNS v.2 - Discussion Points

1. **Adding Response Rate Limiting (RRL)** to Authoritative Servers' practice
 - ccTLD and critical Zone Operators
 - Other SLDs too?
2. **Addressing 'Split' responsibilities** for Authoritative servers' operation:
 - Zone file content is controlled by a third party. i.e root server operators and the root zone itself.
3. **Access reliability:** Reachability over IPv6, RPKI for the prefix used for the DNS servers.
4. **Community review team:** volunteers from the community to work with staff to help with assessing participating candidates or other aspect of KINDNS practice evolution.
5. **Metrics:** help measure the impact of KINDNS adoption on global DNS operations

Some external additional tools

1. **Zonemaster:** <https://zonemaster.net/>

A program that tests a DNS zone configuration with different sanity checks configured in an engine and provides a zone health report.

2. **DNSviz:** <https://dnsviz.net/>

Provides a visual analysis of the DNSSEC authentication chain for a domain name and its resolution path in the DNS namespace, and lists configuration errors detected by the tool.

3. **SuperTool:** <https://mxtoolbox.com/SuperTool.aspx>

An integrated tool that can perform several kind of diagnostics on a domain name, IP address or host name. Documentation available at <https://mxtoolbox.com/restapi.aspx>

4. **Intodns:** <https://intodns.com/>

Checks the health and configuration and provides DNS report and mail servers report.

Stay Informed and Contribute



Website | www.kindns.org

Twitter | <https://twitter.com/4KINDNS>

E-Mail | info@kindns.org

Mailing list | kindns-discuss@icann.org
<https://mm.icann.org/mailman/listinfo/kindns-discuss>



Thank You and Questions

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To be KIND with DNS

An AFRINIC journey

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DNS ... a critical
infrastructure

What is a Critical infrastructure?

- Not only hardware (ISP Backbone, transmission lines, routing equipment, etc.)
- But also Software services (DNS, Email, DB, Web hosting, etc.)
- Any interruption for a significant period of time will seriously impact Internet

Why is DNS a critical infrastructure?

- Without DNS,
 - No name resolution
 - Have to remember the full IP address
 - Hard to make multiple site coexist
 - Lots of spam will find their way



DNS @ AFRINIC

Reverse DNS

- Support the functioning of the ARPA Zone (in-addr.arpa and ip6.arpa) roles that the RIRs and IANA perform
- AFRINIC operate c.ip6-servers.arpa and c.in-addr-servers.arpa
- Run under **AS37181**

Africa Domain Secondary Program

- AfDSP runs under **AS 37177**
- Offer a secondary to TLDs (1st and 2nd)
 - Around 40 ccTLD
 - For 27 countries in Africa
- Separate ASN to not create confusion with operator filters

AfRSCP Africa Root Server Copy Program

- Support the installation of DNS Root servers within Africa region
 - Hardware
 - Admin / contact
- Root operators we work with D, E, F, K, L and very soon M
- Increase DNS resilience in the region

AFRINIC Anycast program



- NS2 (reverse DNS) and CIP (ccTLD)
- We have nodes inside and outside our region
- Both virtual and physical
- Currently we operate from 8 additional locations
 - Physical: Tunisia, Rwanda
 - Virtual: Tanzania, Madagascar, Poland, SA (JNB, CPT, Durban)

The background features three large, overlapping circles in a medium blue color, set against a dark gray background. The circles are arranged horizontally, with the middle circle overlapping the other two. A white horizontal band cuts across the center of the image, containing the text.

Our journey to a more resilient DNS
infrastructure...

10 years ago...

2 datacenter collocation (1 active and 1 DR)

3 physical anycast node

1 virtual location

Up to 10h downtime over the year

Today...

Join the



4 datacenter collocation (all active)

3 physical anycast node

5 virtual location (and counting)

At least 2 virtual nodes per location

99.99% uptime in 2022

KINDNS self assessment

Welcome to Your KINDNS Self-Assessment

This DNS operator self-assessment covers two aspects:

1. Your Core DNS Operation Practices
2. Your Core System Security

Organization (Optional)

AFRINIC Ops

Let's Go! →

Why are you taking this self-assessment? *

☐ To know where I stand with KINDNS practices

☐ To join KINDNS

☐ To use the result to convince my organization to do better securing our DNS operations

☐ Other



Next →



Part 1

Core DNS Operation Practices Assessment*

Which component(s) of the DNS do you run?



Authoritative Servers

Recursive Servers

Both

Managed by a Third Party



Next →

Critical Zones, I implement and adhere to the following practices: *

☐ Practice 1: My authoritative zones are DNSSEC signed and I follow best practices for key management

☐ Practice 2: Access to zone transfer between authoritative servers is restricted to secondary servers only (use of ACLs and/or TSIG to restrict zone transfers)

☐ Practice 3: I have a process in place to check the integrity of my zone file/data

☐ Practice 4: My authoritative nameservers are running on separate servers from my recursive resolvers.

☐ Practice 5: I am using at least two distinct nameservers for each critical zone under my control

☐ Practice 6: My network infrastructure adheres to basic network security best practices (BCP38/MANRS)



Next →

Congratulations, you have completed the **Core DNS Operation Practices** Assessment.

*Your score so far is **195**, plus 0 bonus points for credential management **

Do you want to continue to assess your core security practices?



Next →

Part 2

Core System Security Practices

In addition to implementing best practices for DNS security, availability and resilience, as operators you must also pay careful attention to practices that help harden the platforms that host your DNS. There are three types of hardening practices that we are focusing on: network security, host security, and customers-facing portal and services security. On following screens, and for each of the hardening categories, please select the statements that match your operational practices.



Next →

Network Security: *These best practices are aimed at preventing unauthorized network access to your DNS servers and ensuring your internal traffic does not leak onto other networks.*

Please select the statements that match your operational practices.

☐ Practice 1: ACLs are implemented to restrict network traffic to your DNS servers (Authoritative or Resolver)

☐ Practice 2: BCP38/MANRS egress filtering is implemented so that no network traffic can leave your network with a source IP address that is not assigned to you or your customers.



Next →

Host and Service Security: *These practices are aimed at improving the security of the hosts running DNS services in order to reduce the likelihood of a host compromise, denial of service attack, or other attack.*

Please select the statements that match your operational practices.

☐ Practice 3: The configuration of each of my DNS servers is locked down

☐ Practice 4: User permissions and application access to my system resources are limited. File permissions and ownership restrictions are set so that users and services not directly associated with management of the DNS subsystem do not have read or write access to DNS service configuration, data files, and database subsystems.

☐ Practice 5: System and service configuration files are versioned. For authoritative operators, zone files/data are also versioned.



Next →

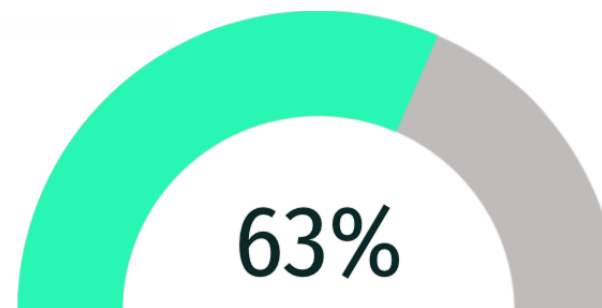
Thank you for completing the KINDNS assessment.

Your score for Authoritative (TLD+SLD) and Resolver Operator practices
is 195 / 300

Your score for the Core System Security assessment is 60 / 100

You do not have bonus points for Credential Management. *Please pay attention to your credential management practices.*

Your Total Score for this assessment is 255 / 400



Download

Take the Self

Thank You For Your Support and Attention.

Should you have any question in this regard,
please feel free to contact us

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