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How it Works: RDAP

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Introduction to WHOIS and RDAP

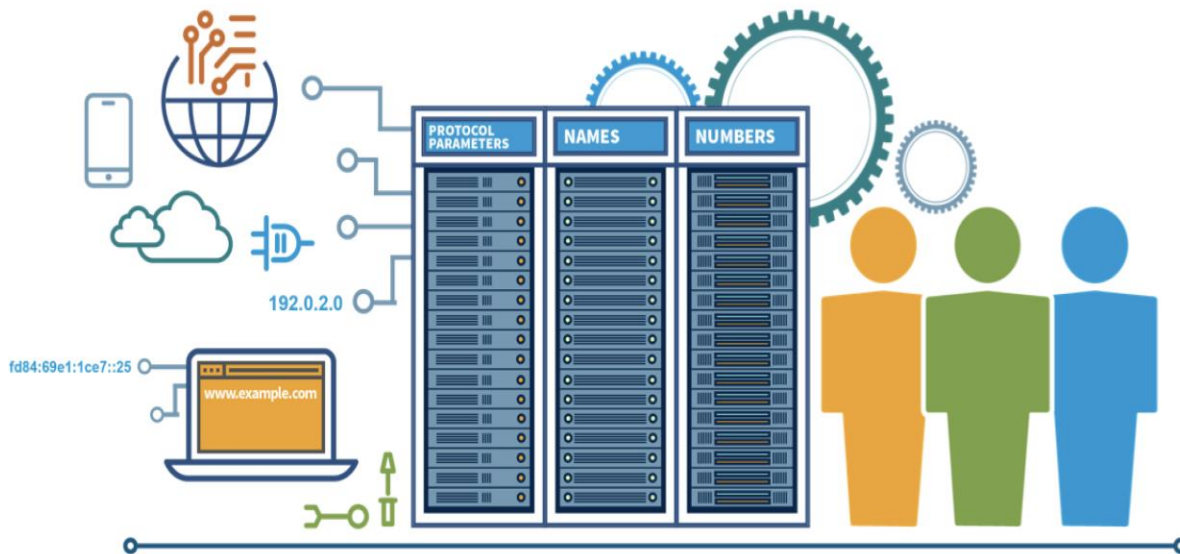
Introduction to WHOIS and RDAP

Yazid Akanho

Technical Engagement Manager, MEA Region

Refresh on ICANN's mission

- Help coordinate the unique identifiers of the Internet
- We work in coordination with other organizations
- To help ensure a stable, secure, and unified global Internet



WHOIS in a nutshell

- WHOIS is a protocol developed in 1982 to **provide netwide directory service** to ARPANET users (RFC 812, last update is RFC 3912).
- A simple query/response to TCP port 43.
- Has undergone numerous improvements with the growth of the Internet. It suffers **limitations** that require to change the protocol.



```
whois -h whois.arin.net 192.0.43.7
NetRange: 192.0.32.0 - 192.0.47.255
CIDR: 192.0.32.0/20
NetName: ICANN
NetHandle: NET-192-0-32-0-1
Parent: NET192 (NET-192-0-0-0)
NetType: Direct Allocation
OriginAS:
Organization: ICANN (ICANN)
RegDate: 2009-06-29
Updated: 2021-12-14
Ref: https://rdap.arin.net/registry/ip/192.0.32.0
```

```
OrgName: ICANN
OrgId: ICANN
Address: 12025 Waterfront Dr.
Address: Suite 300
City: Los Angeles
StateProv: CA
PostalCode: 90094
Country: US
RegDate: 2001-03-30
Updated: 2024-05-31
Ref: https://rdap.arin.net/registry/entity/ICANN
```

```
OrgTechHandle: CORZ01-ARIN
OrgTechName: Corzo, Eduardo
OrgTechPhone: +1-310-301-5800
OrgTechEmail: eduardo.corzo@icann.org
OrgTechRef: https://rdap.arin.net/registry/entity/CORZ01-ARIN
```

```
OrgTechHandle: JENKI373-ARIN
OrgTechName: Jenkins, Josh
OrgTechPhone: +1-310-578-8699
OrgTechEmail: josh.jenkins@icann.org
```

From WHOIS to RDAP

- Why did we need another registration data access protocol ?
 - No standardized input/output format, No internationalization
 - No clear method for finding authoritative services
 - No authentication, No security
- Around **2011**, RIPE NCC & ARIN developed incompatible RESTful services for WHOIS: rWHOIS, WHOIS++, IRIS, WEIRDS
- **2015**, RDAP is standardized (STD 95): RFCs 7480 to 7485, 8056, ...
- **2017**, RySG and RrSG advised to speed up implementation
- **2019**, ICANN required gTLD registries and ICANN-accredited registrars to implement an RDAP service, **28 Jan 2025**, WHOIS sunset for gTLDs
- More about RDAP: <https://www.icann.org/rdap>

RDAP replaces WHOIS

- **Registry Data Access Protocol (RDAP)** was designed in the IETF to offer a directory service for the Internet's unique identifiers.
- RDAP is **a wholesale replacement** for WHOIS.
- WHOIS is not a very robust protocol. RDAP is.
- WHOIS is not a secure protocol. RDAP is.
- WHOIS does not have a standard output format. RDAP does
- WHOIS does not support multiple languages or character sets. RDAP does.

Some benefits of RDAP

- **Standardized query/response/error:** HTTP-based REST-style protocol specificized in JSON format (UTF-8), enabling easy scripting of machine-readable output. Lookups Vs searches.
- **Support for internationalization:** response data objects can be translated into any language (including non-ASCII characters).
- **Bootstrapping mechanism:** to easily find the authoritative server for a query.
- **Standardized redirection/reference** mechanism:
 - From a registry to a registrar (URL referral)
 - From an RIR to another or an NIR to an RIR (HTTP redirect)
- **Differentiated access:** possible to define access rights for different groups.

Other benefits of RDAP

- **Secure access** to data when used over HTTPS (highly recommended)
- **Extensible:** easy to add query and output elements. RDAP extensions: <https://www.iana.org/assignments/rdap-extensions/rdap-extensions.xml>
- Over 30 known RDAP client implementations:
 - ICANN RDAP web client: <https://lookup.icann.org/>
 - ICANN RDAP CLI Client: <https://github.com/icann/icann-rdap>
 - rdap.org: <https://about.rdap.org/> with its deployment dashboard.
 - OpenRDAP: <https://www.openrdap.org/>
 - ... and many more.

WHOIS Vs RDAP: a quick summary

Feature	WHOIS	RDAP
Protocol Type	TCP/IP based (port 43)	HTTP/HTTPS based (RESTful API)
Data Format	Plain text	JSON
Response Structure	Unstructured text, varying by registry	Structured, standardized JSON format
Query Mechanism	Command-line query (e.g., whois <domain>)	HTTP request (e.g., GET /domain/<domain>)
Security	No built-in security	Supports HTTPS (secure connections)
Data Availability	Publicly available, may vary by registry	Publicly available, more consistent format
Internationalization	Limited support for non-Latin characters	Better support for international characters
Extensibility	Limited; simple protocol	Highly extensible with additional data types
Privacy Protections	Limited privacy protection (e.g., WHOIS privacy)	Better privacy features (e.g., data redaction)
Data Access	Often slow, due to reliance on legacy servers	Faster response time due to modern infrastructure
Common Usage	Domain registration information	Domain registration and related services
History	Established in 1980s	Introduced in 2015 as an IETF standard
Authentication	No authentication required	Supports authentication (OAuth, Bearer Tokens)
Privilege Levels	Public access with no role-based controls	Role-based access with different privilege levels
Access Control	None (unless limited by registry policies)	Rate limiting and access control based on user role/authentication

RDAP at RIRs

All five RIRs have implemented RDAP.

RIR	WHOIS	RDAP
AFRINIC	whois.afrinic.net	https://rdap.afrinic.net/rdap
APNIC	whois.apnic.net	https://rdap.apnic.net/
ARIN	whois.arin.net	https://rdap.arin.net/registry/
LACNIC	whois.lacnic.net	https://rdap.lacnic.net/rdap/
RIPE NCC	whois.ripe.net	https://rdap.db.ripe.net/

ICANN RDAP web client

[العربية](#) [简体中文](#) [English](#) [Français](#) [Русский](#) [Español](#)

ICANN | LOOKUP

Registration data lookup tool

Enter a domain name or an Internet number resource (IP Network or ASN) [Frequently Asked Questions \(FAQ\)](#)

Lookup

By submitting any personal data, I acknowledge and agree that the personal data submitted by me will be processed in accordance with the ICANN [Privacy Policy](#), and agree to abide by the website [Terms of Service](#) and the [registration data lookup tool Terms of Use](#).

About ICANN's registration data lookup tool

The ICANN registration data lookup tool gives you the ability to look up the current registration data for domain names and Internet number resources. The tool uses the Registration Data Access Protocol (RDAP) which was created as a replacement of the WHOIS (port 43) protocol. RDAP was developed by the technical community in the [Internet Engineering Task Force](#) (IETF).

RDAP has several advantages over the WHOIS protocol, including more secure access to data, a standardized and user-friendly format, support for internationalization, and the ability to provide differentiated access to registration data. More information can be found [here](#).

<https://lookup.icann.org/>

ICANN RDAP web client

Domain Information

Name: icann.org

Internationalized Domain Name: icann.org

Domain Status:

[serverDeleteProhibited](#)

[clientTransferProhibited](#)

[serverTransferProhibited](#)

[serverUpdateProhibited](#)

Nameservers:

ns.icann.org : 199.4.138.53, 2001:500:89::53

a.icann-servers.net

b.icann-servers.net

c.icann-servers.net

Dates

Registry Expiration: 2028-12-07 17:04:26 UTC

Updated: 2025-01-31 20:19:44 UTC

Created: 1998-09-14 04:00:00 UTC

Contact Information

Registrant:

Organization: Internet Corporation for Assigned Names and Numbers

Email: <https://domaincontact.cscglobal.com/contactholder/icann.org/registrant>

Mailing Address: CA

ISO-3166 Code: US

Redacted for privacy:

some of the data in this object has been removed

Registrar Information

Name: CSC Corporate Domains, Inc.

IANA ID: 299

Abuse contact email: domainabuse@cscglobal.com

Abuse contact phone: tel:+1.8887802723

DNSSEC Information

Max sig life: 1

Delegation Signed: Signed

Delegation Signer Data:

Key Tag: 20149

Algorithm: 13

Digest Type: 2

Digest: cf066bceadb799a27b62e3e82dc2e4da314c1807db98f13d82f0043b1418cf4e

Authoritative Servers

Registry Server URL: <https://rdap.publicinterestregistry.org/rdap/domain/icann.org>

Last updated from Registry RDAP DB: 2025-10-25T21:59:26.902Z

Registrar Server URL: <https://rdap.cscglobal.com/dbs/rdap-api/v1/domain/icann.org>

Last updated from Registrar RDAP DB: 2025-10-25T21:59:26.902Z

Notices and Remarks

Remarks:

REDACTED FOR PRIVACY

Some of the data in this object has been removed

ICANN RDAP Command Line Client (CLI)

Domain <u>icann.org</u>	
Summary	Domain icann.org • Registrant • 299 (Registrar) • b75f0932183049c78ee7ff3c76e102fd-LROR (Abuse) • Nameserver ns.icann.org • Nameserver a.icann-servers.net • Nameserver b.icann-servers.net • Nameserver c.icann-servers.net
Identifiers	
LDH Name	icann.org
Unicode Name	icann.org
Handle	*REDACTED*
IANA Registrar ID	299
Information	
Status	• Server Delete Prohibited • Client Transfer Prohibited • Server Transfer Prohibited • Server Update Prohibited
Whois	

<https://github.com/icann/icann-rdap>

Additional resources

- RDAP Performance (OCTO-029):
<https://www.icann.org/en/system/files/files/octo-024-14dec22-en.pdf>
- ICANN RDAP Conformance Tool: <https://webrdapct.icann.org/>

The Current State of RDAP

The Current State of RDAP

Andy Newton
GDS Technical Services Principal Engineer

What Does RDAP Look Like Today?

- WHOIS Sunset on 28 January 2025.
- More deployments by the ccTLDs.
- Queries across the ecosystem are up.
- New software is available.
- New functionality for existing services.
- Upcoming specifications.

WHOIS Sunset

- WHOIS no longer required for most gTLDs as of 28 January 2025.
- 74 gTLDs dropped WHOIS in February.
 - (according to ICANN reachability scan)
- As of September:
 - 374 gTLDs do not have available WHOIS.
 - (according to the TLD RDAP Monitor)
 - 139 gTLDs do not have reachable WHOIS
 - (according to ICANN reachability scan)

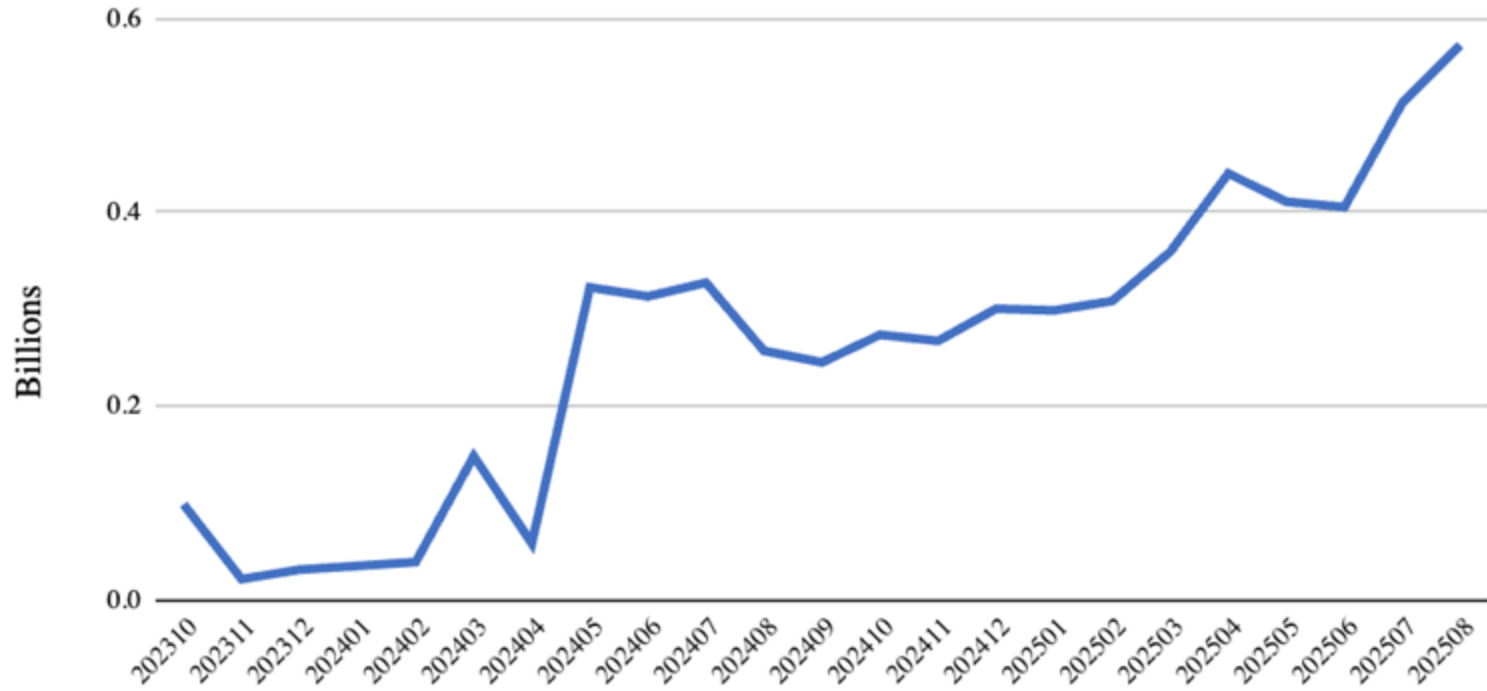
gTLD WHOIS Query Numbers

WHOIS Queries Last 2 Years



gTLD RDAP Query Numbers

RDAP Queries Last 2 Years



Some Other Stats

Where	How Many
ARIN	ARIN regularly sees monthly query volume of 300 million queries/month, with spikes as high as 700 million/month.
rdap.org	rdap.org sees around 10 million queries/month for their redirection service.
lookup.icann.org	~1.5 million views/month
The RDAP ecosystem sees over 1 billion query per month. Assumption: probably not eyeballs but bots.	

Deployment: deployment.rdap.org



~12% increase for ccTLDs since February 2025.

Deployment: rdap.wxapros.com



RDAP Overview

1,440

TOTAL TLDS

78%

COVERAGE

1,194

RDAP READY

22

STEALTH FOUND

Monitoring of 1440 top-level domains across RDAP and WHOIS protocols. 84.5% service reliability with 1009 working endpoints. Plus 22 stealth RDAP servers discovered.

Client Software: rdap.rcode3.com

Type	How Many
Online Web Clients	9
Web Client Software	4
Mobile Clients	3
CLI Clients	10
Client Libraries	21
Total	47

Server Software: rdap.rcode3.com

Type	How Many
Authoritative Servers	11
Redirect Servers	6
Conformance Tools	5

What's to Come...

RDAP RIR Search

- Closes the functionality gap between RDAP and WHOIS for the RIRs.
- Already approved by the IETF (in the RFC Editor's queue).
- Deployed by ARIN. Other RIRs soon to follow.

RDAP RPKI

- Information on RPKI via RDAP.
- `draft-ietf-regext-rdap-rpki`

JSContact

- Moves RDAP beyond vCard/jCard.
- Becomes even more interesting if RPP uses JSContact.



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<https://www.surveymonkey.com/r/HIW84-3>



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