

## Q26 Response

Afilias operates the WHOIS (registration data directory service) infrastructure in accordance with RFCs and global best practices, as it does for the 16 TLDs it currently supports. Designed to be robust and scalable, Afilias' WHOIS service has exceeded all contractual requirements for over a decade. It has extended search capabilities, and methods of limiting abuse.

The WHOIS service operated by Afilias meets and exceeds ICANN's requirements. Specifically, Afilias will:

- Offer a WHOIS service made available on port 43 that is flexible and standards-compliant;
- Comply with all ICANN policies, and meeting or exceeding WHOIS performance requirements in Specification 10 of the new gTLD Registry Agreement;
- Enable a Searchable WHOIS with extensive search capabilities that offers ease of use while enforcing measures to mitigate access abuse, and;
- Employ a team with significant experience managing a compliant WHOIS service.

Such extensive knowledge and experience managing a WHOIS service enables Afilias to offer a comprehensive plan for this TLD that meets the needs of constituents of the domain name industry and Internet users. The service has been tested by our QA team for RFC compliance, and has been used by registrars and many other parties for an extended period of time. Afilias' WHOIS service currently serves almost 500 million WHOIS queries per month, with the capacity already built in to handle an order of magnitude increase in WHOIS queries, and the ability to smoothly scale should greater growth be needed.

### WHOIS system description and diagram

The Afilias WHOIS system, depicted in figure 26-a, is designed with robustness, availability, compliance, and performance in mind. Additionally, the system has provisions for detecting abusive usage (e.g., excessive numbers of queries from one source). The WHOIS system is generally intended as a publicly available single object lookup system. Afilias uses an advanced, persistent caching system to ensure extremely fast query response times.

Afilias will develop restricted WHOIS functions based on specific domain policy and regulatory requirements as needed for operating the business (as long as they are standards compliant). It will also be possible for contact and registrant information to be returned according to regulatory requirements. The WHOIS database supports multiple string and field searching through a reliable, free, secure web-based interface.

### Data objects, interfaces, access and lookups

Registrars can provide an input form on their public websites through which a visitor is able to perform WHOIS queries. The registry operator can also provide a Web-based search on its site. The input form

must accept the string to query, along with the necessary input elements to select the object type and interpretation controls. This input form sends its data to the Afiliat port 43 WHOIS server. The results from the WHOIS query are returned by the server and displayed in the visitor's Web browser. The sole purpose of the Web interface is to provide a user-friendly interface for WHOIS queries.

Afiliat will provide WHOIS output as per Specification 4 of the new gTLD Registry Agreement. The output for domain records generally consists of the following elements:

- The name of the domain registered and the sponsoring registrar;
- The names of the primary and secondary nameserver(s) for the registered domain name;
- The creation date, registration status and expiration date of the registration;
- The name, postal address, e-mail address, and telephone and fax numbers of the domain name holder;
- The name, postal address, e-mail address, and telephone and fax numbers of the technical contact for the domain name holder;
- The name, postal address, e-mail address, and telephone and fax numbers of the administrative contact for the domain name holder, and;
- The name, postal address, e-mail address, and telephone and fax numbers of the billing contact for the domain name holder.

The following additional features are also present in Afiliat's WHOIS service:

- Support for IDNs, including the language tag and the Punycode representation of the IDN in addition to Unicode Hex and Unicode HTML formats;
- Enhanced support for privacy protection relative to the display of confidential information.

Afiliat will also provide sophisticated WHOIS search functionality that includes the ability to conduct multiple string and field searches.

#### Query controls

For all WHOIS queries, a user is required to enter the character string representing the information for which they want to search. The object type and interpretation control parameters to limit the search may also be specified. If object type or interpretation control parameter is not specified, WHOIS will search for the character string in the Name field of the Domain object.

WHOIS queries are required to be either an "exact search" or a "partial search," both of which are insensitive to the case of the input string.

An exact search specifies the full string to search for in the database field. An exact match between the input string and the field value is required.

A partial search specifies the start of the string to search for in the database field. Every record with a search field that starts with the input string is considered a match. By default, if multiple matches are found for a query, then a summary containing up to 50 matching results is presented. A second query is required to retrieve the specific details of one of the matching records.

If only a single match is found, then full details will be provided. Full detail consists of the data in the matching object as well as the data in any associated objects. For example: a query that results in a domain object includes the data from the associated host and contact objects.

WHOIS query controls fall into two categories: those that specify the type of field, and those that modify the interpretation of the input or determine the level of output to provide. Each is described below.

The following keywords restrict a search to a specific object type:

- Domain: Searches only domain objects. The input string is searched in the Name field.
- Host: Searches only nameserver objects. The input string is searched in the Name field and the IP Address field.
- Contact: Searches only contact objects. The input string is searched in the ID field.
- Registrar: Searches only registrar objects. The input string is searched in the Name field.

By default, if no object type control is specified, then the Name field of the Domain object is searched.

In addition, Afilius WHOIS systems can perform and respond to WHOIS searches by registrant name, postal address and contact names. Deployment of these features is provided as an option to the registry operator, based upon registry policy and business decision making.

Figure 26-b presents the keywords that modify the interpretation of the input or determine the level of output to provide.

By default, if no interpretation control keywords are used, the output will include full details if a single match is found and a summary if multiple matches are found.

#### Unique TLD requirements

There are no unique WHOIS requirements for this TLD.

#### Sunrise WHOIS processes

All ICANN TLDs must offer a Sunrise as part of a rights protection program. Afilius uses EPP extensions that allow registrars to submit trademark and other intellectual property rights (IPR) data to the registry. The following corresponding data will be displayed in WHOIS for relevant domains:

- Trademark Name: element that indicates the name of the Registered Mark.
- Trademark Number: element that indicates the registration number of the IPR.
- Trademark Locality: element that indicates the origin for which the IPR is established (a national or international trademark registry).
- Trademark Entitlement: element that indicates whether the applicant holds the trademark as the original “OWNER”, “CO-OWNER” or “ASSIGNEE”.
- Trademark Application Date: element that indicates the date the Registered Mark was applied for.
- Trademark Registration Date: element that indicates the date the Registered Mark was issued and registered.
- Trademark Class: element that indicates the class of the Registered Mark.
- IPR Type: element that indicates the Sunrise phase the application applies for.

#### IT and infrastructure resources

All the applications and databases for this TLD will run in a virtual environment hosted by a cluster of servers equipped with the latest Intel Westmere multi-core processors (or a more advanced, stable technology available at the time of deployment). The registry data will be stored on storage arrays of solid-state drives shared over a fast storage area network. The virtual environment allows the infrastructure to easily scale both vertically and horizontally to cater to changing demand. It also facilitates effective utilization of system resources thus reducing energy consumption and carbon footprint.

The applications and servers are supported by network firewalls, routers and switches.

The WHOIS system accommodates both IPv4 and IPv6 addresses.

Each of the servers and network devices are equipped with redundant hot-swappable components and multiple connections to ancillary systems. Additionally, 24x7 support agreements with our hardware vendor with a 4-hour response time at all our data centers guarantees replacement of failed parts in the shortest time possible.

Models of system and network devices used are:

- Servers: Cisco UCS B230 blade servers
- SAN storage arrays: IBM Storwize V7000 with Solid State Drives
- Firewalls: Cisco ASA 5585-X
- Load balancers: F5 Big-IP 6900

- Traffic shapers: Procera PacketLogic PL8720
- Routers: Juniper MX40 3D
- Network switches: Cisco Nexus 7010, Nexus 5548, Nexus 2232

There will be at least four virtual machines (VMs) offering WHOIS service. Each VM will run at least two WHOIS server instances - one for registrars and one for the public. All instances of the WHOIS service is made available to registrars and the public are rate limited to mitigate abusive behavior.

Frequency of synchronization between servers

Registration data records from the EPP publisher database will be replicated to the WHOIS system database on a near-real-time basis whenever an update occurs.

Specifications 4 and 10 compliance

The WHOIS service for this TLD will meet or exceed the performance requirements in the new gTLD Registry Agreement, Specification 10. Figure 26-c provides the exact measurements and commitments. Afilias has a 10 year track record of exceeding WHOIS performance and a skilled team to ensure this continues for all TLDs under management.

The WHOIS service for this TLD will meet or exceed the requirements in the new gTLD Registry Agreement, Specification 4.

RFC 3912 compliance

Afilias will operate the WHOIS infrastructure in compliance with RFCs and global best practices, as it does with the 16 TLDs Afilias currently supports.

Afilias maintains a registry-level centralized WHOIS database that contains information for every registered domain and for all host and contact objects. The WHOIS service will be available on the Internet standard WHOIS port (port 43) in compliance with RFC 3912. The WHOIS service contains data submitted by registrars during the registration process. Changes made to the data by a registrant are submitted to Afilias by the registrar and are reflected in the WHOIS database and service in near-real-time, by the instance running at the primary data center, and in under ten seconds by the instance running at the secondary data center, thus providing all interested parties with up-to-date information for every domain. This service is compliant with the new gTLD Registry Agreement, Specification 4.

The WHOIS service maintained by Afilias will be authoritative and complete, as this will be a “thick” registry (detailed domain contact WHOIS is all held at the registry); users do not have to query different registrars for WHOIS information, as there is one central WHOIS system. Additionally, visibility of different types of data is configurable to meet the registry operator’s needs.

Searchable WHOIS

Afilias offers a searchable WHOIS on a web-based Directory Service. Partial match capabilities are offered on the following fields: domain name, registrar ID, and IP address. In addition, Afilias WHOIS systems can perform and respond to WHOIS searches by registrant name, postal address and contact names.

Providing the ability to search important and high-value fields such as registrant name, address and contact names increases the probability of abusive behavior. An abusive user could script a set of queries to the WHOIS service and access contact data in order to create or sell a list of names and addresses of registrants in this TLD. Making the WHOIS machine readable, while preventing harvesting and mining of WHOIS data, is a key requirement integrated into the Afilias WHOIS systems. For instance, Afilias limits search returns to 50 records at a time. If bulk queries were ever necessary (e.g., to comply with any applicable laws, government rules or requirements, requests of law enforcement, or any dispute resolution process), Afilias makes such query responses available to carefully screened and limited staff members at the registry operator (and customer support staff) via an internal data warehouse. The Afilias WHOIS system accommodates anonymous access as well as pre-identified and profile-defined uses, with full audit and log capabilities.

The WHOIS service has the ability to tag query responses with labels such as “Do not redistribute” or “Special access granted”. This may allow for tiered response and reply scenarios. Further, the WHOIS service is configurable in parameters and fields returned, which allow for flexibility in compliance with various jurisdictions, regulations or laws.

Afilias offers exact-match capabilities on the following fields: registrar ID, nameserver name, and nameserver’s IP address (only applies to IP addresses stored by the registry, i.e., glue records). Search capabilities are fully available, and results include domain names matching the search criteria (including IDN variants). Afilias manages abuse prevention through rate limiting and CAPTCHA (described below). Queries do not require specialized transformations of internationalized domain names or internationalized data fields

Please see “Query Controls” above for details about search options and capabilities.

#### Detering WHOIS abuse

Afilias has adopted two best practices to prevent abuse of the WHOIS service: rate limiting and CAPTCHA.

Abuse of WHOIS services on port 43 and via the Web is subject to an automated rate-limiting system. This ensures that uniformity of service to users is unaffected by a few parties whose activities abuse or otherwise might threaten to overload the WHOIS system.

Abuse of web-based public WHOIS services is subject to the use of CAPTCHA (Completely Automated Public Turing test to tell Computers and Humans Apart) technology. The use of CAPTCHA ensures that uniformity of service to users is unaffected by a few parties whose activities abuse or otherwise might

threaten to overload the WHOIS system. The registry operator will adopt a CAPTCHA on its Web-based WHOIS.

Data mining of any sort on the WHOIS system is strictly prohibited, and this prohibition is published in WHOIS output and in terms of service.

For rate limiting on IPv4, there are configurable limits per IP and subnet. For IPv6, the traditional limitations do not apply. Whenever a unique IPv6 IP address exceeds the limit of WHOIS queries per minute, the same rate-limit for the given 64 bits of network prefix that the offending IPv6 IP address falls into will be applied. At the same time, a timer will start and rate-limit validation logic will identify if there are any other IPv6 address within the original 80-bit(/48) prefix. If another offending IPv6 address does fall into the /48 prefix then rate-limit validation logic will penalize any other IPv6 addresses that fall into that given 80-bit (/48) network. As a security precaution, Afiliastaff will not disclose these limits.

Pre-identified and profile-driven role access allows greater granularity and configurability in both access to the WHOIS service, and in volume/frequency of responses returned for queries.

Afiliastaff are key participants in the ICANN Security & Stability Advisory Committee's deliberations and outputs on WHOIS, including SAC003, SAC027, SAC033, SAC037, SAC040, and SAC051. Afiliastaff are active participants in both technical and policy decision making in ICANN, aimed at restricting abusive behavior.

#### WHOIS staff resourcing plans

Since its founding, Afiliastaff is focused on delivering secure, stable and reliable registry services. Several essential management and staff who designed and launched the Afiliastaff registry in 2001 and expanded the number of TLDs supported, all while maintaining strict service levels over the past decade, are still in place today. This experiential continuity will endure for the implementation and on-going maintenance of this TLD. Afiliastaff operates in a matrix structure, which allows its staff to be allocated to various critical functions in both a dedicated and a shared manner. With a team of specialists and generalists, the Afiliastaff project management methodology allows efficient and effective use of our staff in a focused way.

Within Afiliastaff, there are 11 staff members who develop and maintain the compliant WHOIS systems. They keep pace with access requirements, thwart abuse, and continually develop software. Of these resources, approximately two staffers are typically required for WHOIS-related code customization. Other resources provide quality assurance, and operations personnel maintain the WHOIS system itself. This team will be responsible for the implementation and on-going maintenance of the new TLD WHOIS service.