

Transparency of the new gTLD's Centralized Zone Data Service: A Measurement Study

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Abstract—The centralized zone data service (CZDS) was initiated by the Internet Corporation for Assigned Names and Numbers (ICANN), a global Internet overseer, to facilitate sharing and access to zone data as hundreds of new generic Top-Level Domains (gTLDs) are added to the Internet. The goal of CZDS is to improve the security and transparency of the naming system. In this study, we explore CZDS's transparency by a measurement study: we request access to zone data of all gTLDs in the CZDS portal and examine various aspects of CZDS operation, including access request status, responsiveness, and reasons for granting or denial of access. We address implications, and how to conduct better results of CZDS using insights of our measurement.

I. INTRODUCTION

The Domain Name System (DNS) is a protocol that provides a hierarchical naming scheme for assigning and resolving domain names to Internet Protocol (IP) addresses. The top of a domain name in the DNS hierarchy is a Top-Level Domain (TLD) [1]. Initially, the TLD naming space was tightly controlled and provided limited names, using the original TLDs of .gov, .edu, .com, .mil, and .org [2]. Recently, the Internet Corporation for Assigned Names and Numbers (ICANN), a nonprofit organization that oversees the process of the coordination and maintenance of the global DNS functions and security, has considered registration of new gTLDs. The new gTLDs are intended for improving the competitiveness of the domain name market, and for providing interested parties with more choices for their naming needs, utilizing context information such as language, brand, location, etc. [3]. The first four new gTLDs were delegated on July 15, 2013, and since then the number of registered and delegated new gTLDs has increased to 1,930 as of April 2016 [4].

In order to promote transparency and improve the security of the new gTLDs, ICANN introduced the centralized zone data service (CZDS), a service for providing a centralized access point for interested individuals to request access to the zone files of the new gTLDs participating in the CZDS. The zone file of a given gTLD is a text file that describes a DNS zone and contains mappings between the Second-level Domain names (SLDs) and Internet Protocol (IP) addresses, among other resources with their corresponding types such as name servers, mail exchange servers, etc. [5]. With an authenticated CZDS in place, a user can supposedly easily request access to zone data of the gTLDs of his choosing in a streamlined process. Whether CZDS provides its intended goals or not is unclear, which is the subject of this work.

Contributions. As transparency is one of the essential motivations for the creation of CZDS, its design, and intended operation, we investigated CZDS's transparency by measurement attempting to answer the following questions. 1) How cooperative are new gTLDs operators with parties interested in zone data and applying through CZDS? 2) How timely are the responses of the new gTLD operators for requests to access their zone data through CZDS? 3) When a new gTLD operator denies a request to access his zone data, what are the stated reasons, and whether they are justified or not?

II. METHODOLOGY

A. Data Collection

We applied for access to all gTLDs in the CZDS portal. On the day of filing the CZDS request access form (November 11, 2015), only 787 out of 1,930 gTLDs were listed as participants in the CZDS portal. We requested access to all listed gTLDs, and traced the time upon which a request to access the zone file of a gTLD is granted or denied, and used the temporal aspect of CZDS operation as the main criterion for its evaluation.

B. Measurement and Criteria

To evaluate CZDS, we use the status of requests (approved, denied, pending) and the reasons behind denial. We investigated whether individual administrators of new gTLDs are amenable to and cooperative in granting access to reasonably justified requests. We also attempted to find out the reason behind the denial cases, where provided. We do so for gTLDs in isolation and along with other gTLDs requested and infer reasons from their associated information. This information is used to understand whether the denial is justifiable or not. In the following, we elaborate more on the evaluation metrics.

Request status. We utilized the request status for evaluating CZDS and listed gTLDs. For each gTLD, there is one among three possible status values: approved, denied, or pending (no decision is taken by administrators on whether to grant access to a request to their zone files). We define a timing criterion for evaluation: the request-to-decision, as follows.

Request-to-Decision (RtD). *The time (in days) between the request to access a given zone data of a new gTLD and the grant (or denial, individually) of that zone data.*

III. RESULTS

A. Request Status

Using the criterion above, we analyzed the behavior of various gTLD owners using their final decisions concerning

our request to access the zone files through CZDS. As of July 11, 2016 (eight months after the request to all zones has been filed), we found that 708 requests to zone files of different gTLDs were approved, 70 were denied, and 9 were still pending. A summary of the outcomes of the request is shown in Figure 1. In total, we found that the requests were either denied or not answered for roughly 10% of all requests.



Fig. 1: Response status.

B. Request-to-Decision (RtD) time

We measured the RtD time, which indicates the responsiveness of the various new gTLD owners. We considered each of the cases separately: approved access and denied access (we discard the pending case, since it is temporally meaningless). **Approved access.** Figure 2(a) shows the cumulative distribution function of request-to-decision time for the approved access for 708 gTLDs requested. Figure 2(a) does not include the nine pending gTLDs, nor 70 denied gTLDs. The results in this figure highlight various interesting findings and aspects of CZDS as a collective service of various gTLD operators. First, the median point of time to grant access to a zone file of a gTLD was just under two days, indicated a somewhat timely response. Second, of the total number of gTLDs requested in this work, 80% took less than ten days, which is somewhat long (i.e., 30% of requests took between two and ten days). We notice that such time is reasonably acceptable in accordance with reviews for granting access. However, we also note that about 20% of the requested gTLDs took more than ten days, of which about 13% too more than 20 days, about 6% took 30 or more days, and about 2% took more than 40 days without any justification to why it took that long to grant access.

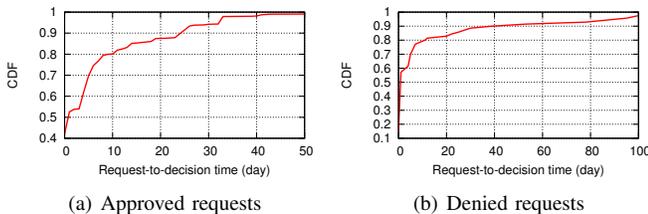


Fig. 2: CDF of request-to-decision time.

Denied access. Figure 2(b) shows the cumulative distribution function of request-to-decision time for the denied access for 70 gTLDs. In comparison with the approval time, we found out that denial of requests came faster: within 24 hours, more than 57% of all denied cases were decided. Moreover, it took less than five days for 70% of the denials, 39 days for 90%, 78 days for about 93%, 95 days for about 96%, and 118 days for all of the denials to be decided. While it is possible that

TABLE I: Reasons for rejection, with reason, the number of applied for (#), and the percent of applied for (%).

Reason	#	%
Invalid request	25	35.71%
No IP address provided	21	30%
Incomplete user information	14	20%
Lack of the required credentials	10	14.29%

processing applications would potentially take long time, the reasons provided for denial suggest otherwise.

C. Reasons for denied access

Table I summarizes the reasons for denied access. Out of 70 gTLDs, 25 were denied for “invalid request”, 21 were denied for “no IP address provided”, 14 were denied for “incomplete user information”, and ten were denied for “lack of the required credentials”. We notice that none of those provided reason is true, since all information requested is provided at the time of filing the CZDS access application.

To further understand CZDS transparency, we examined the owners of these 70 gTLDs based on their reasons for rejection. We found that the majority of gTLDs are owned by a single owner. While the various TLDs use different websites for the administrative purposes, we noticed that the primary point of contact for the various TLDs is the same person, thus establishing the connection between the various TLDs.

IV. CONCLUSION

The majority of zone owners (89.96%) granted access and responded (mostly) in a timely manner: out of all the gTLDs that granted access to their zones, 80% took less than ten days.

There are some negative implications of findings unveiled in this work. Some of the approval and denials took a long time, which is particularly striking with time-sensitive applications that use zone files, such as automated name collision detection. Reasons for denial are shown to be unjustified. Pending status even after eight months is not justified, nor irresponsible registries are held accountable by ICANN.

The various aspects of this work highlight the need for a well-thought-out process and policy by ICANN for the participation in this essential service, by specifying a reasonable time for response, and clear conditions for denial. None of those issues is represented in ICANN’s current policy of CZDS, and they are purely left for the gTLD admins. Monitoring of CZDS operation to ensure meeting deadlines should be easy with the centralized nature of CZDS.

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