Problem Statement for Identical DNS Resolution of Bundle Names
draft-yao-dnsext-identical-resolution-00.txt

Abstract

This document specifies the problems related to the identical resolution of bundle DNS names. With the emergence of internationalized domain names, two names with the same meaning or visual similarity sometimes require the identical resolution. Current DNS protocols have not provided such ability to satisfy these requirements.

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1. Introduction

If one domain name is the alias of another domain name, the CNAME will be used for that name. If the name wants to map its descendants to other domain, the DNAME will be used. If the name wants to map itself and its descendants to another domain, what should we do. The current protocols do not support to do so. There can have a lot of names under the DNS zones. Some of these names are very similar. The DNS was designed under the environment of ASCII characters, but the naming similarity in English is not very popular; the requirements of identical resolution of these names does not cause the attentions of the IETF DNS engineers. With the internationalized domain names protocols publishing in 2006 and updating in 2008, more and more internationalized domain name labels [RFC3490] appear in the DNS trees. Some labels [RFC3743] are equivalent in some languages. For examples: For English speak users, color and colour are same; For Chinese speak users, Chinese character U+56FD and its variant U+570B look differently, but are identical in the meaning. The Internet users hope them to be identical in the DNS resolution. For example, color.example.com==colour.example.com. On the other hand, ICANN’s "Final Implementation Plan for IDN ccTLD Fast Track Process" said that the desired IDN TLD variants will be allocated, and may be put into the root. ICANN currently does not find the perfect technical solution to put the IDN TLD variants into the root.

1.1. Terminology

All the basic terms used in this specification are defined in the documents [RFC1034], [RFC1035], [RFC2672] and [RFC3490].

2. Problem Statement

2.1. Character Variants

Many languages have the character variants. Although there is no uniform definition of variants, the variants are popular in many languages. The definition of variant characters in the JET Guidelines [RFC3743]: One conceptual character can be identified with several different Code Points in character sets for computer use. In UNICODE, Some characters can be identified as the compatibility variants of another character, which usually implies that the first can be remapped to the second without the loss of any meaning. In this document, variant characters are two or more characters that may be similar in appearance or identical in meaning. ICANN is pushing the IDN TLD into the root server. Some IDN TLD has the variants. How to deal with the IDN TLD variant issue is a big challenge ahead of us. For example, if the IDN TLD "China" (U+4E2D U+56FD) and its
variant (U+4E2D U+570B) are put into the root, the first one (U+4E2D U+56FD) is called as the original IDN TLD and the second one (U+4E2D U+570B) is called as the IDN TLD variant. In an ideal way, the original IDN TLD and its IDN TLD variant SHOULD be identical in the DNS resolution. If case mapping is regarded as the variant, the uppercase A is the variant of lowercase a. For example, the "COM" is the variant of "com". These variants need to be identical in the DNS resolution, which has been done so in the DNS protocols. However, we can not find the ideal solution of identical DNS resolution for the IDN TLD variants.

2.2. Registration of Domain Name Variants

With the development of internationalized domain names protocols, more and more domain names and their variants appear in the Internet. Without careful management of the domain name variants, there will have more phising related security problems. [RFC3743] developed by JET (Joint Engineering Team) gives a solution of how to manage the registration of domain name and its variants. [RFC3743] proposed an algorithm which will allocate the domain name and its variants to the same domain holder. It means that the domain holder will get the bundle of the domain name and its variants. [RFC4290] suggests the practice in [RFC3743] to be used in registrations of internationalized domain names. But [RFC3743] and [RFC4290] do not define how these bundle of names get the identical DNS resolution. [RFC4690] said that the "variant" model introduced in [RFC3743] and [RFC4290] can be used by a registry to prevent the worst consequence of the possible confusion, by ensuring either that both names are registered to the same party in a given domain or that one of them is completely prohibited. The principle of [RFC3743], [RFC4290] and [RFC4690] have been accepted by many registries. In the technology level, we can not guarantee that these bundle of domain names get the identical DNS resolution.

2.3. Identical DNS Resolution for Bundle DNS Names

Identical DNS Resolution means that two domain names will finally get the same result, in most cases the same IP address. The Internet users hope that the domain names and its variants to be identical in DNS resolution. In the history of DNS protocol development, there has already two kinds of identical resolution: CNAME[RFC1034] which maps or redirects itself and DNAME[RFC2672] which maps or redirects its descendants. In the case of bundle Names, identical DNS resolution of all levels’ domain names including the domain name itself and its descendants are expected. Current technologies do not allow to do so. Some suggestions trying to use the current technology are proposed in the draft of "IDN TLD Variants Implementation Guideline" [IDN-TLD-Variants], but this is a mechanism.
of combination of both technology and policy, which is not a perfect solution.

3. Possible Solutions

Currently, there are two possible solutions to the identical DNS resolution of bundle names: Bundle Names direction [BNAME] and Zone clone. Both solutions have their advantages and disadvantages. The implementers may select one of them to be used.

3.1. Mapping or Redirection of Domain Names

3.1.1. Mapping itself

A host can have many names. The Internet users need these multiple names to be resolved to the same IP address by a DNS server. CNAME record [RFC1034], an abbreviation of Canonical Name Records, is responsible for the aliases of the real host name of a computer. In some cases, the CNAME can work for these bundle of variant domain names. But the CNAME only maps itself, not its descendants. In the case of IDN TLD variants, IDN TLD variants need to map itself and its variants.

3.1.2. Mapping its descendants

In order to maintain the address-to-name mappings in a context of network renumbering, a DNAME record or Delegation Name record defined by [RFC2672] creates an alias for all its subdomains. In contrast, the CNAME record creates an alias only of a single name (and not of its subdomains). Like the CNAME record, the DNS lookup will continue by retrying the lookup with the new name. If a DNS resolver sends a query without EDNS[EDNS0], or with EDNS version 0, then a name server synthesizes a CNAME record to simulate the semantics of the DNAME record. A DNAME record is very much alike the CNAME record, but while the CNAME record only applies for one name, with a DNAME record one can create alias for all the records for its subdomain.

3.1.3. Mapping itself and its descendants

The bundle of variant domain names requires to map the whole tree of the domain space to another domain. The current DNS protocols do not support this function. A new DNS resource record [BNAME] may be invented to deal with this problem.
3.2. Zone Clone

Zone Clone proposed by Paul Vixie from Internet Software Consortium is an alternative solution to getting the identical DNS resolution of bundle domain names.

4. IANA Considerations

There is no IANA consideration.

5. Security Considerations

There may have more discussions related to DNSSEC [RFC4033], [RFC4034] and [RFC4035] in the future version.

6. Acknowledgements

Many ideas are from the discussion in the DNSOP and DNSEXT mailing list. Thanks a lot to all in the list. Many important comments and suggestions are contributed by many members of the DNSEXT and DNSOP WG.

7. Change History

[[anchor15: RFC Editor: Please remove this section.]]

7.1. draft-yao-dnsext-identical-resolution: Version 00

- Domain Name Identical Resolution Problem Statement

8. References

8.1. Normative References


8.2. Informative References


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