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**The ALT Special Use Top Level Domain
draft-ietf-dnsop-alt-tld-03**

Abstract

This document reserves a string (ALT) to be used as a TLD label in non-DNS contexts or for names that have no meaning in a global context. It also provides advice and guidance to developers developing alternate namespaces.

[Ed note: This document lives in GitHub at:
<https://github.com/wkumari/draft-wkumari-dnsop-alt-tld> . Issues and pull requests happily accepted.]

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[1.](#) Introduction

Many protocols and systems need to name entities. Names that look like DNS names (a series of labels separated with dots) have become common, even in systems that are not part of the global DNS administered by IANA.

This document provides a solution that may be more appropriate than [\[RFC6761\]](#) in many cases.

This document reserves the label "ALT" (short for "Alternate") as a Special Use Domain ([\[RFC6761\]](#)). This label is intended to be used as the final label to signify that the name is not rooted in the DNS, and that normal registration and lookup rules do not apply.

[1.1.](#) Requirements notation

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [\[RFC2119\]](#).

[1.2.](#) Terminology

This document assumes familiarity with DNS terms and concepts. Please see [\[RFC1034\]](#) for background and concepts, and [\[I-D.ietf-dnsop-dns-terminology\]](#) for terminology.

- o DNS name: Domain names that are intended to be used with DNS resolution, either in the global DNS or in some other context
- o DNS context: The namespace anchored at the globally-unique DNS root. This is the namespace or context that "normal" DNS uses.
- o non-DNS context: Any other (alternate) namespace.
- o pseudo-TLD: A label that appears in a fully-qualified domain name in the position of a TLD, but which is not registered in the global DNS.
- o TLD: The last visible label in either a fully-qualified domain name or a name that is qualified relative to the root. See the discussion in [Section 2](#).

2. Background

The DNS data model is based on a tree structure, and has a single root. Conventionally, a name immediately beneath the root is called a "Top Level Domain" or "TLD". TLDs usually delegate portions of their namespace to others, who may then delegate further. The hierarchical, distributed and caching nature of the DNS has made it the primary resolution system on the Internet.

Domain names are terminated by a zero-length label, so the root label is normally invisible. Truly fully-qualified names indicate the root label explicitly, thus: "an.example.tld.". Most of the time, names are written implicitly relative to the root, thus: "an.example.tld". In both of these cases, the TLD is the last label that is visible in presentation format -- in this example, the string "tld". (This little bit of pedantry is here because, in different contexts, people can use the term "fully-qualified domain name" to refer to either of these uses.) It is worth noting that the root label is present in the on-wire format of fully-qualified domain names, even if not displayed in the presentation form.

The success of the DNS makes it a natural starting point for systems that need to name entities in a non-DNS context, or that have no unique meaning in a global context. These name resolutions, therefore, occur in a namespace distinct from the DNS.

In many cases, these systems build a DNS-style tree parallel to, but separate from, the global DNS. They often use a pseudo-TLD to cause resolution in the alternate namespace, using browser plugins, shims in the name resolution process, or simply applications that perform special handling of this particular alternate namespace.

In many cases, the creators of these alternate namespaces have chosen a convenient or descriptive string and started using it. These new strings are "alternate" strings and are not registered anywhere or part of the DNS. However they appear to users and to some applications to be TLDs. Issues may arise if they are looked up in the DNS. These include:

- o User confusion: If someone emails a link of the form foo.bar.pseudo-TLD to someone who does not have the necessary software to resolve names in the pseudo-TLD namespace, the name will not resolve and the user may become confused.
- o Excess traffic hitting the DNS root: Lookups leak out of the pseudo-TLD namespace and end up hitting the DNS root nameservers.
- o Collisions: If the pseudo-TLD is eventually delegated from the root zone, the lookup behavior will change in a non-deterministic fashion.
- o Lack of success for the user's original goal.

An alternate name resolution system might be specifically designed to provide confidentiality of the looked up name, and to provide a distributed and censorship-resistant namespace. This goal would necessarily be defeated if the queries leak into the DNS, because the attempt to look up the name would be visible at least to the operators of root name servers and to any entity viewing the DNS lookups going to the root nameservers.

3. The ALT namespace

In order to avoid the above issues, we reserve the ALT label. Unless the name desired is globally unique, has meaning on the global context and is delegated in the DNS, it should be considered an alternate namespace, and follow the ALT label scheme outlined below. The ALT label MAY be used in any domain name as a pseudo-TLD to signify that this is an alternate (non-DNS) namespace.

Alternate namespaces should differentiate themselves from other alternate namespaces by choosing a name and using it in the label position just before the pseudo-TLD (ALT). For example, a group wishing to create a namespace for Friends Of Olaf might choose the string "foo" and use any set of labels under foo.alt.

As they are in an alternate namespace, they have no significance in the regular DNS context and so should not be looked up in the DNS context. Some of these requests will inevitably leak into the DNS context (for example, because clicks on a link in a browser that does

not have a extension installed that implements the alternate namespace resolution), and so the ALT TLD has been added to the "Locally Served DNS Zones" ([\[RFC6303\]](#)) registry to limit how far these flow.

Groups wishing to create new alternate namespaces SHOULD create their alternate namespace under a label that names their namespace, and under the ALT label. They SHOULD choose a label that they expect to be unique and, ideally, descriptive. There is no IANA controlled registry for names under the ALT TLD - it is an unmanaged namespace, and developers are responsible for dealing with any collisions that may occur under .alt. Informal lists of namespaces under .alt may appear to assist the developer community.

[Editor note (to be removed before publication): There was significant discussion on an IANA registry for the ALT namespace - please consult the lists for full thread, but the consensus seems to be that it would be better for the IETF / IANA to not administer a registry for this. It is expected one or more unofficial lists will be created where people can list the strings that they are using.]

Currently deployed projects and protocols that are using pseudo-TLDs may decide to move under the ALT TLD, but this is not a requirement. Rather, the ALT TLD is being reserved so that current and future projects of a similar nature have a designated place to create alternate resolution namespaces that will not conflict with the regular DNS context.

3.1. Choice of the ALT Name

A number of names other than "ALT" were considered and discarded. In order for this technique to be effective the names need to continue to follow both the DNS format and conventions (a prime consideration for alternate name formats is that they can be entered in places that normally take DNS context names); this rules out using suffixes that do not follow the usual letter, digit, and hyphen label convention.

Another proposal was that the ALT TLD instead be a reservation under .arpa. This was considered, but rejected for several reasons, including:

1. We wished this to make it clear that this is not in the DNS context, and .arpa clearly is.
2. The use of the string .alt is intended to evoke the alt.* hierarchy in Usenet.
3. We wanted the string to be short and easily used.

4. A name underneath .arpa would consume at least five additional octets of the total 255 octets available in domain names, which could put pressure on applications that need long machine-generated names.
5. We are suggesting that the string "ALT" get special treatment in resolvers, and shim software. We are concerned that using subdomains of an existing TLD (like .arpa) might end up with bad implementations misconfiguring / overriding the TLD itself and breaking .arpa.

There is a concern that if there were placed under .arpa, inexperienced nameserver operators may inadvertently cover .arpa. A more significant concern is that the scope of the issue if the query does leak, and the fact that this would then make the root of the alternate naming namespace a third level domain, and not a second one. A project may be willing to have a name of the form example.alt, but example.alt.arpa may be not look as good.

4. IANA Considerations

The IANA is requested to add the ALT string to the "Special-Use Domain Name" registry ([\[RFC6761\]](#)), and reference this document. In addition, the "Locally Served DNS Zones" ([\[RFC6303\]](#)) registry should be updated to reference this document.

4.1. Domain Name Reservation Considerations

This section is to satisfy the requirement in [Section 5 of RFC6761](#).

The domain "alt.", and any names falling within ".alt.", are special in the following ways:

1. Human users are expected to know that strings that end in .alt behave differently to normal DNS names. Users are expected to have applications running on their machines that intercept strings of the form <namespace>.alt and perform special handling of them. If the user tries to resolve a name of the form <namespace>.alt without the <namespace> plugin installed, the request will leak into the DNS, and receive a negative response.
2. Writers of application software that implement a non-DNS namespace are expected to intercept names of the form <namespace>.alt and perform application specific handling with them. Other applications are not intended to perform any special handling.

3. In general, writers of name resolution APIs and libraries do not need to perform special handling of these names. If developers of other namespaces implement their namespace through a "shim" or library, they will need to intercept and perform their own handling.
4. Caching DNS servers SHOULD recognize these names as special and SHOULD NOT, by default, attempt to look up NS records for them, or otherwise query authoritative DNS servers in an attempt to resolve these names. Instead, caching DNS servers SHOULD generate immediate negative responses for all such queries.
5. Authoritative DNS servers SHOULD recognize these names as special and SHOULD, by default, generate immediate negative responses for all such queries, unless explicitly configured by the administrator to give positive answers for private-address reverse-mapping names.
6. DNS server operators SHOULD be aware that queries for names ending in .alt are not DNS names, and were leaked into the DNS context (for example, by a missing browser plugin). This information may be useful for support or debugging purposes.
7. DNS Registries/Registrars MUST NOT grant requests to register "alt" names in the normal way to any person or entity. These "alt" names are defined by protocol specification to be nonexistent, and they fall outside the set of names available for allocation by registries/registrar.

5. Security Considerations

One of the motivations for the creation of the alt pseudo-TLD is that unmanaged labels in the managed root name space are subject to unexpected takeover if the manager of the root name space decides to delegate the unmanaged label.

The unmanaged and "registration not required" nature of labels beneath .alt provides the opportunity for an attacker to re-use the chosen label and thereby possibly compromise applications dependent on the special host name.

6. Acknowledgements

We would also like to thank Joe Abley, Mark Andrews, Marc Blanchet, John Bond, Stephane Bortzmeyer, David Cake, David Conrad, Patrik Faltstrom, Olafur Gudmundsson, Paul Hoffman, Joel Jaeggli, Ted Lemon, Edward Lewis, George Michaelson, Ed Pascoe, Arturo Servin, and Paul Vixie for feedback.

7. Normative References

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- [RFC6303] Andrews, M., "Locally Served DNS Zones", [BCP 163](#), [RFC 6303](#), DOI 10.17487/RFC6303, July 2011, <<http://www.rfc-editor.org/info/rfc6303>>.
- [RFC6761] Cheshire, S. and M. Krochmal, "Special-Use Domain Names", [RFC 6761](#), DOI 10.17487/RFC6761, February 2013, <<http://www.rfc-editor.org/info/rfc6761>>.

Appendix A. Changes / Author Notes.

[RFC Editor: Please remove this section before publication]

From -02 to -03:

- o Incorporate suggestions from Stephane and Paul Hoffman.

From -01 to -02:

- o Merged a bunch of changes from Paul Hoffman. Thanks for sending a git pull.

From -00 to 01:

- o Removed the "delegated to new style AS112 servers" text -this was legacy from the omniscient AS112 days. (Joe Abley)
- o Removed the "Advice to implemntors" section. This used to recommend that people used a subdomain of a domain in the DNS. It was pointed out that this breaks things badly if the domain expires.

- o Added text about why we don't want to administer a registry for ALT.

From Individual-06 to DNSOP-00

- o Nothing changed, simply renamed [draft-wkumari-dnsop-alt-tld](#) to [draft-ietf-dnsop-alt-tld](#)

From -05 to -06

- o Incorporated comments from a number of people, including a number of suggestion heard at the IETF meeting in Dallas, and the DNSOP Interim meeting in May, 2015.
- o Removed the "Let's have an (optional) IANA registry for people to (opportunistically) register their string, if they want that option" stuff. It was, um, optional....

From -04 to -05

- o Went through and made sure that I'd captured the feedback received.
- o Comments from Ed Lewis.
- o Filled in the "Domain Name Reservation Considerations" section of [RFC6761](#).
- o Removed examples from .Onion.

From -03 to -04

- o Incorporated some comments from Paul Hoffman

From -02 to -03

- o After discussions with chairs, made this much more generic (not purely non-DNS), and some cleanup.

From -01 to -02

- o Removed some fluffy wording, tightened up the language some.

From -00 to -01.

- o Fixed the abstract.

- o Recommended that folk root their non-DNS namespace under a DNS namespace that they control (Joe Abley)

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