CNAME+DNAME Name Redirection
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Abstract

This document updates RFC1034 to allow coexistence of the CNAME Resource Record with DNAME Resource Record at the same owner node, which provides redirection for a sub-tree of the domain name tree in the DNS system, in a parent zone. By allowing this coexistence, DNS system will have a way how to create a sub-tree redirection together that includes the Resource Records owner name. This would allow parent zones to create full domain aliases.

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RFC 1034 [RFC1034] defines CNAME resource record for cases when there are multiple names for a single host. A CNAME resource record identifies its owner name as an alias, and specifies the corresponding canonical name in the RDATA section of the resource record. If a CNAME resource record is present at a node, no other data MUST be present; this ensures that the data for a canonical name and its aliases cannot be different. This rule also insures that a cached CNAME can be used without checking with an authoritative server for other resource record types.

However there is already existing exceptions to this rule. RFC 4034 [RFC4034] defines exception to RRSIG and NSEC records, which MUST exist for the same name as a CNAME resource record in a signed zone.

RFC 6672 [RFC6672] defines DNAME resource record, which provides redirection for a sub-tree of the domain name tree in the DNS system. That is, all names that end with a particular suffix are redirected to another part of the DNS.

The DNAME RR and the CNAME RR RFC 1034 [RFC1034] cause a lookup to (potentially) return data corresponding to a domain name different from the queried domain name. The difference between the two resource records is that the CNAME RR directs the lookup of data at its owner to another single name, a DNAME RR directs lookups for data
at descendents of its owner’s name to corresponding names under a
different (single) node of the tree.

1.1. Terminology

All the basic terms used in this specification are defined in the
documents RFC 1034 [RFC1034], RFC 1035 [RFC1035], and RFC 6672
[RFC6672].

1.2. Requirements Language

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 RFC 2119 [RFC2119].

2. Motivation

In some languages, some characters has the variants, which look
differently or very similar but are identical in the meaning. For
example, Chinese character U+56FD and its variant U+570B look
differently, but are identical in the meaning. If Internationalized
Domain Label or "IDL" RFC 3743 [RFC3743] are composed of variant
characters, we regard this kind of IDL as the IDL variant. If these
IDL variants are put into the DNS for resolution, they are expected
to be identical in the DNS resolution. More comprehensible example
is that we expect color.example.com to be equivalent with the
colour.example.com in the DNS resolution. Currently this is
something we are unable to achieve without copying the data for the
owner of the domain record (ie. for the color.example.com) and
keeping it in sync by some external mechanism. The CNAME+DNAME
record placed in the parent zone will remove this need for
synchronization. Without this bundling mechanism, current mechanisms
such as DNAME or CNAME are not enough capable to solve all the
problems with the emergence of internationalized domain names. The
internationalized domain names may have alias or equivalence of the
original one.

The CNAME+DNAME is not limited to internationalized domain names.
This bundling could be used by TLD registries to offer additional
service for it’s registrants. F.e. a hosting company could create
generic record for it’s service and with simple CNAME+DNAME bundle it
can create all needed DNS resource records for providing this
service.

There are already such uses of CNAME which violates existing DNS
standards by replying with CNAME records in the apex of the zone.
This proposal would allow these perpetrators to comply with the DNS
standard again.
3. CNAME+DNAME Bundle

This proposal doesn’t change wire formats of the existing CNAME and DNAME records. It also doesn’t change handling of the CNAME and DNAME on the resolver side.

4. Query processing

Existing rules for a DNAME RR and a CNAME RR are still valid with following exception: The DNAME and CNAME resource records MAY co-exist at the same owner name in the parent zone.

4.1. Processing by Authoritative Servers

The authoritative server implementations MUST allow CNAME record when there is a DNAME record for the same name and vice versa.

The authoritative server implementations compliant with this specification SHOULD add an associated DNAME record into an ADDITIONAL (or ANSWER?) section for any non-DNAME query along with the CNAME record that would be normally required. This would allow recursive DNS server implementation that understand the DNAME record to synthetize the answers for the subtree directly without making an additional queries to the respective authoritative DNS servers.

4.2. Processing by Recursive Servers

The recursive server implementations MUST NOT deny CNAME record when there is a DNAME record already present in the cache for the same name and vice versa.

The recursive DNS server implementation SHOULD accept the extra DNAME resource record that would be returned along with the CNAME record in the ADDITIONAL (or ANSWER?) section.

5. Implementation Report

The author has implemented a change for BIND 9 authoritative server during the IETF Hackathon in Montreal, and the domain with CNAME+DNAME can be tested at www.cname-plus-dname.rocks.

The conducted experiment confirmed that BIND, Unbound and Google Public DNS work fine, Knot Resolver has a bug that makes the DNS answer contain the DNAME records, but with RCODE=SERVFAIL, and PowerDNS returns RCODE=SERVFAIL for any DNAME query. The other public DNS implementations follow the errors of their respective deployed software.
6. Security Considerations

In case the recursive DNS server looking for records has enabled DNS Query Name Minimization (RFC 7816 [RFC7816]), the CNAME+DNAME specification might make the resolver send one more label than needed from the original DNS Query Name to the nameservers authoritative for the CNAME+DNAME records unless the authoritative DNS server preemptively returns DNAME record along with the CNAME resource record for the minimized query, and at the same time the recursive DNS server understand the additional data in the answer and utilizes it to synthetize the answer.

7. IANA Considerations

This document makes no requests of IANA.

8. References

8.1. Normative References


8.2. Informative References


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