

## Importance Of Parent-side TTLs For Referrals Several Layers Deep

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### Abstract

This memo documents a consequence of how the TTL re-writing mechanism works (or rather does not work) for the case of a resolver chasing a referral chain several layers deep.

The most common example of this is the case of a recursive resolver trying to look up a third level domain name starting from the root.

A result of how this works is that it seems to be a good idea to recommend an increase of the present standard TTL for delegations from the root zone from the present 48 hours to something significantly longer. But, more importantly, the choice of TTL for the referral from the parent should be a decision made by the child, not the parent.

### 1. Introduction.

When a resolver queries an authoritative server it has to be prepared for several possible responses. The responses relevant here are primarily

- a) "The Answer", i.e. a response with the answer to the query in the Answer section and the enclosing NS RRset in the Authority section
- b) "The Referral", i.e. a response with an empty Answer section and the NS RRset of the child in the Authority section.

In the case of the referral the NS RRset is cached based upon the TTL associated with the involved records.

In the probably most common case this referral will soon be followed by an "Answer"-response from the child and then the TTL for the NS RRset of the child will be re-written because the child is authoritative for the contents of its own NS RRset and that data is supplied in the Authority section of the response.

Since the NS RRset supplied by the parent will therefore only be used once and then overwritten it does not matter much what TTL is used by the parent for the referral.

However, in the case where the child will respond with another referral (i.e. referring further down the hierarchy to a grandchild of the parent) the response will contain an Authority section with the referral data for the grandchild, rather than the child's authoritative statement on its own NS RRset.

In this case the NS RRset for the child supplied by the parent will not be overwritten and therefore it will stay in the cache of the recursive resolver for as long as the parent-side TTL specifies. In this case the parent-side TTL will matter very much.

## 2. Recommendation.

Following a referral several layers down into the DNS hierarchy is especially common when looking up data starting from the root. Therefore every TLD will be subject to this phenomena of the child (i.e. the TLD) not updating the TTL information for the referral from the parent. There are examples in other parts of the hierarchy too.

Therefore it would be correct to let the child influence the choice of parent-side TTL for a referral. In the particular case of TLD referrals increasing the present 48 hour TTL significantly seems appropriate.

Exactly how long a suitable TTL is will vary, but given that typical turn-around time for changes to the root zone is on the order of several weeks it does not seem excessive to use a one week TTL as a base recommendation.

### [3. Security Considerations.](#)

It is conceivable that using a longer TTL than 48 hours in a TLD delegation may cause problems in the case of an emergency rollover from an old NS RRset to a new one.

On the other hand it is also conceivable that a resolver may be cut off from root name service for a period of time during which the cached referrals expire. By using a longer TTL the risk of this scenario is decreased.

Which case is considered most likely or most important will not be the same for all zones. It is therefore not a good idea to have the TTL of the referral be decided by the parent since it should be a decision for the child.

### [4. IANA Considerations.](#)

Presently IANA uses the same 48 hour TTL on all delegation information from the root, arpa and in-addr.arpa zones. Based upon the argument above it is recommended that this practice is replaced by instead honoring the wishes of the child for what TTL is appropriate in each particular case.

### [5. References](#)

#### [5.1. Normative.](#)

[RFC1034] Domain Names – Concepts and Facilities. P.V. Mockapetris, November 1987.

[RFC1035] Domain Names – Implementation and Specification. P.V. Mockapetris. November 1987.

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