DS TTL shortening experience in .JP

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Background

• One of the biggest concern with registrants and ISPs deploying DNSSEC
  – DNS name resolution will fail if DNSSEC operation was failed
  – Especially, mismatch of DS in parent zone with DNSKEY in child zone requires urgent recovery between parent and child zone administrators (typically, registrant ⟷ registrar ⟷ registry)
  – Even though urgent recovery has done, the influence will remain until DS cache in validators being expired
  – Registrants and ISPs want to shorten this duration
Possible counter measures

1. Flush failed domain’s cache in validators
   - Ad hoc solution
   - Hard to reach each validators’ operators
   - Almost impossible

2. Shorten DS TTL in parent zone
   - Effective solution
   - Moderate value is not widely shared yet
   - Possible
Measurement in .JP

• Dataset and target
  – Query log of 2 out of 7 JP DNS
  – Duration of 9 Sep 2013 – 15 Sep 2013 (typical 1 week)
  – Analyzed DS query ratio
  – DSC graph of 6 out of 7 JP DNS showed the same DS query ratio, so we considered this analysis estimates whole JP DNS

• Analysis results (overview)
  – DS queries / whole DNS queries: about 3.5%
    c.f. Increase of probable DNSSEC Validators and DNSSEC side effect
  – Existing DS queries / whole DS queries: about 0.08%
    Existing DS queries means DS queries to domain names which have DS records
DS query ratio

Date

9-Sep-13 10-Sep-13 11-Sep-13 12-Sep-13 13-Sep-13 14-Sep-13 15-Sep-13

DS ratio (%)

Existing DS ratio

Existing DS ratio (%)

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Steps to decide moderate DS TTL

1. Similarity with NCACHE TTL
2. Estimation of influence to current JP DNS
3. Decision
1. Similarity with NCACHE TTL

- DS TTL can be considered as a duration of influence when name resolution failure occurred by DS registration failure.
- NCACHE TTL is a duration of status when query name did not exist.
- There are similarity between DS and NCACHE regarding name resolution failure.
- NCACHE TTL is recommended value is 1 hour (3600) to 3 hours (10800) (RFC 2308).
- DS TTL would also be effective within the range above.
2. Estimation of influence to current JP DNS

- TTL=86400 (Current)
  - DS query ratio: 3.5%
  - Existing DS query ratio: 0.08%
- TTL=10800 (1/8)
  - DS query ratio: 3.5% (no increase)
  - Existing DS query ratio: 0.60% (~x8)
- TTL=7200 (1/12)
  - DS query ratio: 3.5% (no increase)
  - Existing DS query ratio: 0.90% (~x12)
- TTL=3600 (1/24)
  - DS query ratio: 3.5% (no increase)
  - Existing DS query ratio: 1.78% (~x24)
JP’s decision

- Selected the best value for .JP from following conditions

<table>
<thead>
<tr>
<th>Conditions</th>
<th>TTL 10800 (1/8)</th>
<th>TTL 7200 (1/12)</th>
<th>TTL 3600 (1/24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small impact to current JP DNS</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Enough scale to shorten DS TTL</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Existing DS queries will not increase drastically when DS and/or validators are increased</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
</tr>
</tbody>
</table>
Conclusion

- JPRS decided to shorten DS TTL from 86400 to 7200
  - This value works fine with current JP zone
  - Moderate value will be changed according to increase of validators and DS records
- JPRS shortened DS TTL on 17 Nov 2013
  - DS query ratio was not increased (as estimated)
- Please give your comments based on your similar experiences
  - Would like to have (TLDs’) best practice