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IETF 100 dnsop WG
Differences from draft-wkumari-dnsop-multiple-responses

• Authoritative name server software developers choose additional records
  – Without configuration
  – or system wide config: like “minimal-responses”
  – Like MX, SRV responses on BIND 9, NSD
    • They add mail exchange A/AAAA in additional sec.

• Aggressive appending NSEC/NSEC3 RRs
  – To generate NODATA/NXDOMAIN responses by RFC 8198
Background

• DNS standards allow for supplemental information to be included in the “additional” section of the DNS response
  – Existing implementations already add MX mail exchange A/AAAA or SRV Target A/AAAA
  – Developers know well
• DNSSEC guarantees that these additional records will be accepted/cached (RFC 2181)
• Validating resolvers can synthesize NODATA/NXDOMAIN responses using cached NSEC* RRs (RFC 8198)
Proposal of additional-answers

• Authoritative name server software developers choose query/answer and additional records pairs
  – The draft proposes good pairs
• To increase the probability that these extra data will actually be useful for resolvers,
  – The query has DNSSEC OK bit set
  – Additional records are signed by DNSSEC
  – Additional records may contain NSEC* RRs for the query and other related names
  – Responses with additional records fit in required response size
Additional answer pairs

Query: additional answers

- name A: name AAAAA/NSEC*
- name AAAAA: name A/NSEC*
- name MX: mail_exchange A/AAAAA/NSEC*
- name SRV: target_host A/AAAAA/NSEC*
- name A/AAAAA: _443._tcp.name TLSA/NSEC*
- _443._tcp.name TLSA: name A/AAAAA/NSEC*

TLSA / MX / SRV pairs have different names.
NSEC* means NSEC or matching NSEC3
Experimental implementation

- Add a code at `add_rrset()` in `nsd/query.c`

```c
add_rrset(...) {
    ....
    switch (rrset_rrtype(rrset)) {
        ....
        case TYPE_A:
            rrset2 = domain_find_rrset(owner, query->zone, TYPE_AAAA);
            if (rrset2) {
                answer_add_rrset(answer, ADDITIONAL_A_SECTION, owner, rrset2);
            } else {
                answer_nodata(query, answer, owner); // add NSEC* (and SOA)
            }
        break;
    ....
```
Multiple response proposals

- draft-vavrusa-dnsop-aaaaa-for-free
  - Additional AAAA in **answer section**
- draft-wkumari-dnsop-multiple-answers
  - **Pseudo RR** controls additional RRs
- draft-fujiwara-additional-answers
  - **Developers** choose additional RRs (+NSEC*)
- draft-bellis-dnsext-multi-qtypes
  - New EDNS option carries additional **qtypes**
- draft-yao-dnsop-accompanying-questions
  - New EDNS option carries additional **qnames, qtypes, rcodes**
## Comparison of proposals

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<th>aaaa for free</th>
<th>multi qtypes</th>
<th>Accompanying questions</th>
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<td>large?</td>
<td>large?</td>
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