A DNS Query including A Main Question with Accompanying Questions

draft-yao-dnsop-accompanying-questions-02

J. Yao
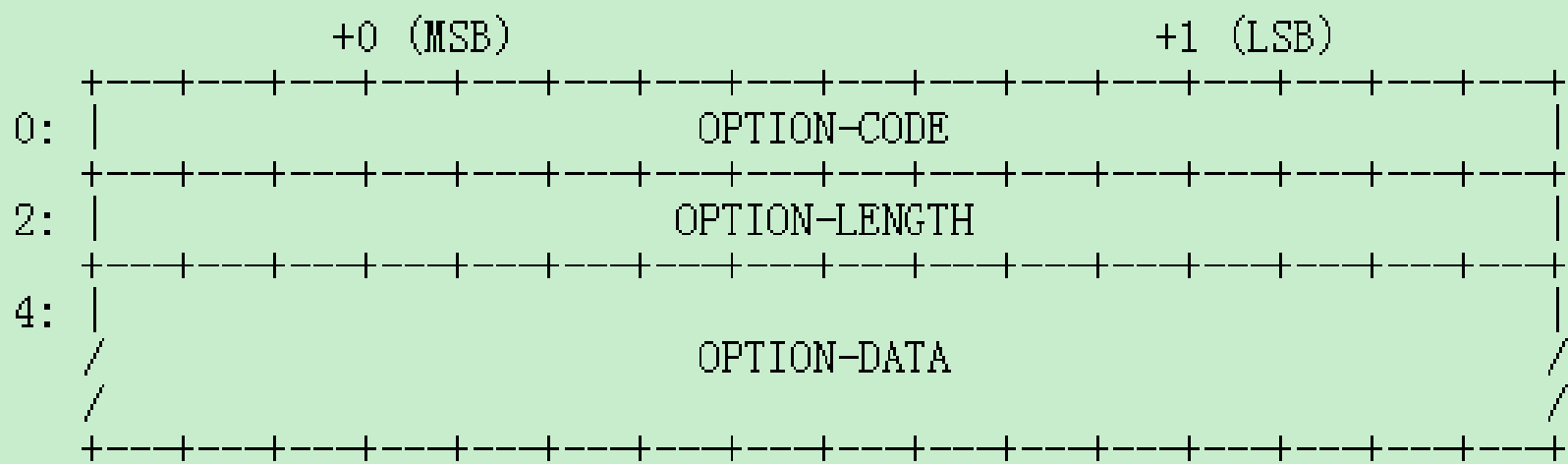P. Vixie
CNNIC-Farsight Joint Laboratory
N. Kong
X. Li
CNNIC
IETF 97

Scenarios

- There are many scenarios in which an application must send several related questions to a DNS responder. For examples,

  - Query example.com for A and AAAA

  When asking about a QTYPE=A RRset, a QTYPE=AAAA RRset may also be of use [RFC 5321];

  - Query www.example.com for A and AAAA, and _443._tcp.www.example.com for TLSA

  When asking for some RRset of www.example.com about A and AAAA, records of a sub-domain name such as _443._tcp.www.example.com for TLSA may be of interest[RFC 6698].

```
              +0 (MSB)                            +1 (LSB)
      +--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
  0:  |                   OPTION-CODE                  |
      +--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
  2:  |                  OPTION-LENGTH                 |
      +--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
  4:  |                                                |
      /                   OPTION-DATA                  /
      /                                                /
      +--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+|

  OPTION-CODE      (Assigned by IANA.)

  OPTION-LENGTH   Size (in octets) of OPTION-DATA.

  OPTION-DATA     including at most 6 accompanying questions with AQ-RCODE.
```

```
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|   Reserved    |                   AQ-RCODE                    |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                           AQ-TYPE                             |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                          AQ-ANCOUNT                           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                          AQ-NSCOUNT                           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                          AQ-ARCOUNT                           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                                                              |
/                           Prefix                             /
/                                                              /
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|   Reserved    |                   AQ-RCODE                    |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                           AQ-TYPE                             |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                          AQ-ANCOUNT                           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                          AQ-NSCOUNT                           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                          AQ-ARCOUNT                           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                                                              |
/                           Prefix                             /
/                                                              /
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                                                              |
/                           . . . . . .                        /
/                                                              /
```

◆ o AQ-RCODE field . The AQ aware responders will put the RCODE value for the query of this question into AQ-RCODE fields.

◆ o AQ-ANCOUNT field will indicate the number of resource records in the answer section for this accompanying question. The AQ aware responders will put the ANCOUNT value for the query of this question into AQ-ANCOUNT field.

◆ o AQ-NSCOUNT field will indicate the number of name server resource records in the authority records section for this accompanying question. The AQ aware responders will put the NSCOUNT value for the query of this question into AQ-NSCOUNT field.

◆ o AQ-ARCOUNT field will indicate the number of resource records in the additional records section for this accompanying question. The AQ aware responders will put the ARCOUNT value for the query of this question into AQ-ARCOUNT field.

◆ o Prefix field indicates a domain name with the form of a pointer or a sequence of labels ending with a pointer using the message compression defined in section 4.1.4. of RFC 1035. The domain name for accompanying questions MUST be same with the domain name for a main question or be children name of it.

Responder Processing

- The AQ aware responder will check the main question first, and put the results into the DNS response packet following RFC 1034.

- If the AQ OPT is present, the responder assembles the prefix with the main domain name and makes it to be an accompanying question, checks the accompanying questions in order, and put the results into the DNS answer section, authority section or additional records section of the response following RFC 1034;

- The response code is placed in the respective AQ-RCODE field in AQ OPT of the response. The RCODE field in the DNS response header refers to the main question only.

- The AQ aware responders will put the ANCOUNT, NSCOUNT and ARCOUNT value for the query of this accompanying question into the respective AQ-ANCOUNT, AQ-NSCOUNT and AQ-ARCOUNT fields. The ANCOUNT, NSCOUNT and ARCOUNT fields in the DNS response header refer to the main question only.

Initiator Processing

- An AQ aware initiator will put the main question into the question section of the DNS query packet, and put related accompanying questions into the related accompanying question fields of OPTION- DATA of OPT RR.

- AQ-RCODE value will be sent as 111111110100 bits. The AQ-TYPE value should be set as the query type related to accompanying questions.

- The Prefix value should be set as a pointer or a sequence of labels ending with a pointer pointing to the main domain name of the main question for the respective accompanying domain name of the accompanying question.

The query would look like:

```
           +---------------------------------------------------------+
Header     | OPCODE=SQUERY                                           |
           +---------------------------------------------------------+
Question   | QNAME=EXAMPLE.COM., QCLASS=IN, QTYPE=A                  |
           +---------------------------------------------------------+
Answer     |                                                         |
           +---------------------------------------------------------+
Authority  | <empty>                                                 |
           +---------------------------------------------------------+
Additional |                                                         |
           |   AQ-TYPE=AAAA, AQ-RCODE=11111110100,                  |
           |   Prefix=EXAMPLE.COM.,                                  |
           |   AQ-TYPE=TLSA,, AQ-RCODE=11111110100,                 |
           |   Prefix=_443._tcp.EXAMPLE.COM.,                       |
           +---------------------------------------------------------+
```

The response from AQ aware responders would be:

```
            +-----------------------------------------------------+
Header      | OPCODE=SQUERY,   RESPONSE, AA, RCODE=NOERROR        |
            |       ANCOUNT=1, ARCOUNT=1, NSCOUNT=0               |
            +-----------------------------------------------------+
Question    | QNAME=EXAMPLE.COM., QCLASS=IN, QTYPE=A             |
            +-----------------------------------------------------+
Answer      |           example.com  IN A 192.168.0.1           |
            |           example.com. IN AAAA 2001:cc8::1         |
            |     _443._tcp.example.com. IN TLSA                 |
            |          ( 3 0 0 3082030730820lefa003020102020... )|
            +-----------------------------------------------------+
Authority   | <empty>                                            |
            +-----------------------------------------------------+
Additional  |                                                    |
            |   AQ-TYPE=AAAA, AQ-RCODE=NOERROR, AQ-ANCOUNT=1,    |
            |                   AQ-ARCOUNT=0, AQ-NSCOUNT=0,       |
            | Prefix=EXAMPLE.COM.,                               |
            |   AQ-TYPE=TLSA, AQ-RCODE=NOERROR, AQ-ANCOUNT=1,    |
            |                   AQ-ARCOUNT=0, AQ-NSCOUNT=0,       |
            | Prefix=_443._tcp.EXAMPLE.COM.,                     |
            +-----------------------------------------------------+
```

```
        The response from AQ unaware responders  would be:

          +------------------------------------------------------+
Header    | OPCODE=SQUERY,   RESPONSE,  AA,  RCODE=NOERROR        |
          +------------------------------------------------------+
Question  | QNAME=EXAMPLE.COM., QCLASS=IN, QTYPE=A                |
          +------------------------------------------------------+
Answer    |           example.com.   IN A 192.168.0.1            |
          +------------------------------------------------------+
Authority | <empty>                                              |
          +------------------------------------------------------+
Additional|                                                      |
          |  AQ-TYPE=AAAA, AQ-RCODE=11111110100,                 |
          |  Prefix=EXAMPLE.COM.,                                |
          |  AQ-TYPE=TLSA,  AQ-RCODE=11111110100,                |
          |  Prefix=_443._tcp.EXAMPLE.COM.,                      |
          +------------------------------------------------------+
```

Q&A