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Author: R. Bellis
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DNS Multiple QTYPEs

Abstract

This document specifies a method for a DNS client to request additional DNS record types to be delivered alongside the primary record type specified in the Question section of a DNS QUERY (OpCode=0).

Status of This Memo

This is an Internet Standards Track document.

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1. Introduction

A commonly requested DNS [STD13] feature is the ability to receive multiple related resource records (RRs) in a single DNS response.

For example, it may be desirable to receive the A, AAAA, and HTTPS RRs for a domain name together, rather than having to issue multiple queries.

The DNS wire protocol in theory supported having multiple questions in a single packet, but in practice this does not work. [RFC9619] updates RFC 1035 [STD13] to only permit a single question in a QUERY (OpCode=0) request.

Sending QTYPE=ANY does not guarantee that all resource record sets (RRsets) will be returned. Section 4.1 of [RFC8482] specifies that responders may return a single RRset of their choosing.

This document provides a solution for those cases where only the QTYPE varies by specifying a new option for the Extension Mechanisms for DNS (EDNS) [RFC6891] that contains an additional list of QTYPE values that the client wishes to receive in addition to the single QTYPE appearing in the Question section. A different EDNS option is used in response packets as protection against DNS middleboxes that echo EDNS options verbatim.

The specification described herein is applicable both for queries from a stub resolver to recursive servers, and from recursive resolvers to authoritative servers. It does not apply to Multicast DNS queries [RFC6762], which are already designed to allow requesting multiple records in a single query, but it is applicable to DNS-Based Service Discovery (DNS-SD) [RFC6763].

2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

This document makes use of DNS terminology defined in [RFC9499].

3. Specification

3.1. Multiple QTYPE EDNS Options Format

The overall format of an EDNS option is shown for reference in Figure 1, per [RFC6891], followed by the option-specific data.

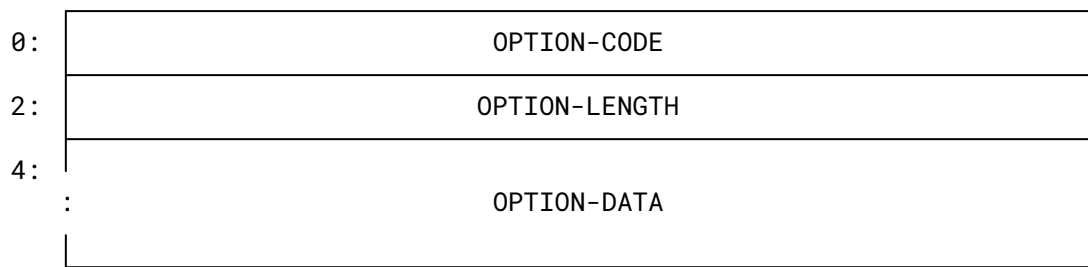


Figure 1: EDNS Option Format

OPTION-CODE: MQTYPE-Query (20) in queries and MQTYPE-Response (21) in responses.

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

OPTION-DATA: Option specific, as depicted in Figure 2.

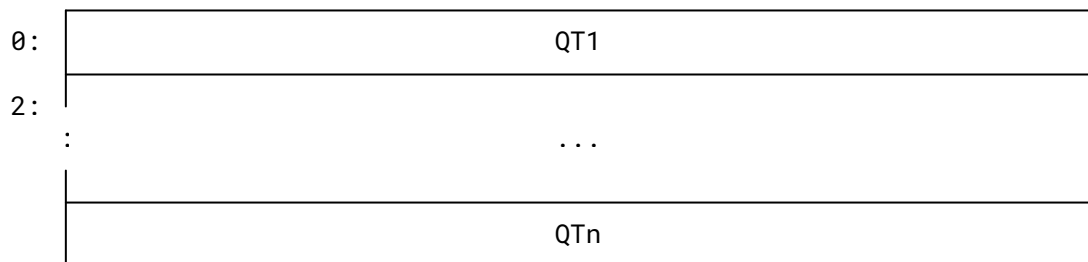


Figure 2: MQTYPE OPTION-DATA Format

The OPTION-DATA is a list of 2-octet values in network order, most significant bit (MSB) first, and each specifying a DNS RRTYPE that must be for a data RRTYPE as described in Section 3.1 of [RFC6895]. Individual values from the list (with unspecified index "x") are referred to as "QTx" in the following sections.

3.2. Client Request Generation

DNS clients implementing this specification **MUST** generate packets that conform to the server request parsing rules described in Section 3.3.

The choice of when a client implementation should attempt to coalesce queries for multiple QTYPEs using this method is implementation specific and not discussed further herein. However, careful considerations should be taken into account when coalescing queries on behalf of an

application, if such a feature is not explicitly requested by the application. How an application interacts with an underlying name resolution library is internal to the implementation and is thus out of scope.

3.3. Server Request Parsing

In addition to the error cases discussed in [Section 7](#) of [\[RFC6891\]](#), the server **MUST** return a FORMERR response if the server receives:

- An MQTYPE-Query option in any inbound DNS message with an OpCode other than QUERY (0).
- An MQTYPE-Response option in any inbound DNS message.
- More than one MQTYPE-Query option in a query.
- An MQTYPE-Query in a query that contains no primary question (i.e., QDCOUNT=0).
- An MQTYPE-Query option in a query where the primary question is a non-data RRTYPE (e.g., ANY, AXFR).
- An MQTYPE-Query option with an empty QT list.
- An invalid QTx (e.g., one corresponding to a Meta RRTYPE).
- A duplicate QTx (or one duplicating the primary QTYPE field) in a query.

3.4. Server Response Generation

A conforming server that receives an MQTYPE-Query option in a valid query **MUST** return an MQTYPE-Response option in its response, even if that response is truncated (TC=1). This is necessary to indicate that the server does support this extension. Refer to [Section 3.3](#) for invalid queries.

The server **MUST** first start constructing a response for the primary (QNAME, QCLASS, QTYPE) tuple specified in the Question section per the existing DNS sections. The RCODE and all other flags (such as AA or AD) **MUST** be determined at this time.

If this initial response results in truncation (TC=1), then the additional queries specified in the MQTYPE-Query option **MUST NOT** be processed.

After the initial response is prepared, the server **MUST** attempt to combine the responses for individual (QNAME, QCLASS, QTx) combinations into the response for the first query. If a recursive server does not yet have those responses available, it **MAY** first make appropriate outbound queries to populate its caches.

For each individual combination, the server **MUST** evaluate the resulting RCODE and other flags and check that they all match the values generated from the primary query.

If any mismatch is detected, the mismatching additional response **MUST NOT** be included in the final combined response, and its QTx value **MUST NOT** be included in the MQTYPE-Response option's list. This might happen, for example, if the primary query resulted in a NOERROR

response, but a QTx query resulted in a SERVFAIL. This could also happen if the primary response has AA=0, but a QTx response has AA=1, which might happen if the NS and DS records were both requested at the parent side of a zone cut.

The server **MUST** attempt to combine the remaining individual RRs into the same sections in which they would have appeared in a standalone query (i.e., as if each combination had been "the question" per Section 4.1 of RFC 1035 [STD13]).

The server **MUST** detect duplicate RRs and keep only a single copy of each RR in its respective section. Duplicates can occur, for example, in the Answer section if a CNAME chain is involved, or in the Authority section if multiple QTYPEs don't exist, etc. Note that RRs can be legitimately duplicated in different sections such as for the (SOA, TYPE12345) combination at a zone apex where TYPE12345 is not present.

The handling of an MQTYPE-Query option **MUST NOT** itself trigger a truncated response. If response size (or other) limits do not allow all of the data obtained by querying for an additional QTx to be included in the final response in their entirety (i.e., as complete RRsets), then the server **MUST NOT** include the respective QTx in the MQTYPE-Response option's list and **MAY** stop processing further QTx combinations.

If all RRs for a single QTx combination fit into the message, then the server **MUST** include the respective QTx in the MQTYPE-Response option's list to indicate that the given query type was completely processed.

Note that it is possible for the resulting MQTYPE-Response option to contain an empty list, but as described above, the option must still be returned.

3.5. Client Response Processing

If the response to a query containing an MQTYPE-Query option does not contain an MQTYPE-Response option, or if it erroneously contains an MQTYPE-Query option, the client **MUST** treat the response as if this option is unsupported by the server and **MUST** process the primary response as if the MQTYPE-Query option had not been used.

In the above case, or if the server generates a FORMERR response, the client **MUST** issue additional standalone queries (that is, without using the MQTYPE-Query option) for all QTYPEs for which an answer is still required.

If the MQTYPE-Response option is present more than once or if a QTx value is duplicated (or duplicates the primary QTYPE field), the client **MUST** treat the answer as invalid (equivalent to FORMERR).

The Question section and the list of types present in the MQTYPE-Response option indicates the list of (QNAME, QCLASS, QTYPEs) combinations that are completely answered and contained within the received response. The answers to all query combinations share the same RCODE and all other flags.

All RRs required by existing DNS specifications are expected to be present in the respective sections of the DNS message, including proofs of nonexistence where required. The client **MUST NOT** rely on any particular order of RRs in the message sections.

For the purposes of [Section 5.4.1](#) of [RFC2181], any authoritative answers received **MUST** be ranked the same as the answer for the primary question.

Clients **MUST** take into account that individual RRs might originate from different DNS zones and that proofs of nonexistence might have been produced by different signers.

Absence of QTx values that were requested by the client but are not present in the MQTYPE-Response option indicates that:

- (for responses from recursive servers) the server does not have any records for that QTx value in cache, and/or
- the individual responses could not be combined into one message because of RCODE or other flag mismatches, and/or
- the server was unwilling to process the request (for example, because a limit was exceeded), and/or
- the response size limit would be exceeded.

The client **MUST** subsequently initiate separate standalone queries for all QTx values for which an answer is still required.

4. Security Considerations

The method documented here does not change any of the security properties of the DNS protocol itself.

However, it should be noted that this method does increase the potential amplification factor when the DNS protocol is used as a vector for a denial-of-service attack. A further risk is being able to maliciously cause recursive servers to perform large amounts of additional work.

Implementors **SHOULD** therefore allow operators to configure limits on the number of QTx values specified and/or the resulting response size. The recommended values of those limits will depend on the environment in which this specification is used. In public DNS, it is expected that a limit of four QTx values would be appropriate, but when used with DNS-SD or within private networks, higher limits would be acceptable.

5. IANA Considerations

IANA has assigned the following values in the "DNS EDNS0 Option Codes (OPT)" registry within the "Domain Name System (DNS) Parameters" registry group:

Value	Name	Status	Reference
20	MQTYPE-Query	Optional	RFC 10029
21	MQTYPE-Response	Optional	RFC 10029

Table 1: MQTYPE EDNS Option Numbers

6. References

6.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.
- [RFC2181] Elz, R. and R. Bush, "Clarifications to the DNS Specification", RFC 2181, DOI 10.17487/RFC2181, July 1997, <<https://www.rfc-editor.org/info/rfc2181>>.
- [RFC6891] Damas, J., Graff, M., and P. Vixie, "Extension Mechanisms for DNS (EDNS(0))", STD 75, RFC 6891, DOI 10.17487/RFC6891, April 2013, <<https://www.rfc-editor.org/info/rfc6891>>.
- [RFC6895] Eastlake 3rd, D., "Domain Name System (DNS) IANA Considerations", BCP 42, RFC 6895, DOI 10.17487/RFC6895, April 2013, <<https://www.rfc-editor.org/info/rfc6895>>.
- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.
- [RFC9619] Bellis, R. and J. Abley, "In the DNS, QDCOUNT Is (Usually) One", RFC 9619, DOI 10.17487/RFC9619, July 2024, <<https://www.rfc-editor.org/info/rfc9619>>.
- [STD13] Internet Standard 13, <<https://www.rfc-editor.org/info/std13>>.
At the time of writing, this STD comprises the following:
- Mockapetris, P., "Domain names - concepts and facilities", STD 13, RFC 1034, DOI 10.17487/RFC1034, November 1987, <<https://www.rfc-editor.org/info/rfc1034>>.
- Mockapetris, P., "Domain names - implementation and specification", STD 13, RFC 1035, DOI 10.17487/RFC1035, November 1987, <<https://www.rfc-editor.org/info/rfc1035>>.

6.2. Informative References

- [RFC6762] Cheshire, S. and M. Krochmal, "Multicast DNS", RFC 6762, DOI 10.17487/RFC6762, February 2013, <<https://www.rfc-editor.org/info/rfc6762>>.

- [RFC6763] Cheshire, S. and M. Krochmal, "DNS-Based Service Discovery", RFC 6763, DOI 10.17487/RFC6763, February 2013, <<https://www.rfc-editor.org/info/rfc6763>>.
- [RFC8482] Abley, J., Gudmundsson, O., Majkowski, M., and E. Hunt, "Providing Minimal-Sized Responses to DNS Queries That Have QTYPE=ANY", RFC 8482, DOI 10.17487/RFC8482, January 2019, <<https://www.rfc-editor.org/info/rfc8482>>.
- [RFC9499] Hoffman, P. and K. Fujiwara, "DNS Terminology", BCP 219, RFC 9499, DOI 10.17487/RFC9499, March 2024, <<https://www.rfc-editor.org/info/rfc9499>>.

Appendix A. Examples

The examples below are shown as what might be reported by the Internet Systems Consortium (ISC) Dig utility. For the purposes of brevity, irrelevant content is omitted.

A.1. Stub Query for A with MQTYPE-Query for AAAA and HTTPS

In this example, a stub resolver has requested the A record for `www.example.com`, along with an MQTYPE-Query option requesting AAAA and HTTPS records. The stub resolver has also set the DO bit, indicating DNSSEC support.

The presence of the HTTPS QTYPE in the MQTYPE-Response option of the response coupled with its absence from the Answer section indicates that the recursive server currently holds no data for this QTYPE. The corresponding type fields in the NSEC3 record further provide a cryptographic proof of nonexistence for the HTTPS QTYPE, and the SOA record also indicates a "negative answer".

```
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 11111
;; flags: qr rd ra ad
;; QUERY: 1, ANSWER: 4, AUTHORITY: 4, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: do; udp: 1232
; MQTYPE-Response: AAAA HTTPS

;; QUESTION SECTION:
;www.example.com.          IN  A

;; ANSWER SECTION:
www.example.com.    2849 IN  A      192.0.2.1
www.example.com.    2849 IN  RRSIG   A [...]
www.example.com.    3552 IN  AAAA    3fff::1234
www.example.com.    3552 IN  RRSIG   AAAA [...]

;; AUTHORITY SECTION:
example.com.        2830 IN  SOA     ns.example.com. [...]
example.com.        2830 IN  RRSIG   SOA 13 2 [...]
[...].example.com.  2830 IN  NSEC3   [...] A TXT AAAA RRSIG
[...].example.com.  2830 IN  RRSIG   NSEC3 [...]
```

Figure 3: A, AAAA, and HTTPS

A.2. Stub Query for DS with MQTYPE-Query for DNSKEY

In this similar example, the primary QTYPE is for DS, and the MQTYPE-Query field only contains DNSKEY.

Both the DS and DNSKEY records are returned, along with their corresponding RRSIG records.

```
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 33333
;; flags: qr rd ra ad
;; QUERY: 1, ANSWER: 5, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: do; udp: 1232
; MQTYPE-Response: DNSKEY

;; QUESTION SECTION:
example.com.                IN      DS

;; ANSWER SECTION:
example.com.      625    IN  DNSKEY  256 3 13 [...]
example.com.      625    IN  DNSKEY  257 3 13 [...]
example.com.      625    IN  RRSIG   DNSKEY [...] example.com. [...]
example.com.     86185   IN  DS      370 13 2 [...]
example.com.     86185   IN  RRSIG   DS [...] com. [...]
```

Figure 4: Stub DS and DNSKEY

A.3. Recursive Query for DS with MQTYPE-Query for NS

In this instance, a recursive resolver is sending a DS record query to the parent zone's authoritative server and simultaneously requesting the NS records for the zone.

Since the DS record response is marked as authoritative (AA = 1), but the NS record data on the parent side of a zone cut is not authoritative (AA = 0), the server is unable to merge the responses, and the NS QTYPE is omitted from the MQTYPE-Response field.

```
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 33333
;; flags: qr aa
;; QUERY: 1, ANSWER: 5, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: do; udp: 1232
; MQTYPE-Response: [empty]

;; QUESTION SECTION:
example.com.                IN  DS

;; ANSWER SECTION:
example.com.      86185   IN  DS      370 13 2 [...]
example.com.      86185   IN  RRSIG   DS [...] com. [...]
```

Figure 5: Recursive DS and NS

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Author's Address

Ray Bellis

Internet Systems Consortium, Inc.

PO Box 360

Newmarket, NH 03857

United States of America

Phone: [+1 650 423 1300](tel:+16504231300)

Email: ray@isc.org