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J. Abley
Dyn, Inc.
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Ordering of RRSets in DNS Messages
draft-jabley-dnsop-ordered-answers-00

Abstract

The existing Domain Name System (DNS) specifications lack some clarity in their description of the process by which individual sections of a DNS message are constructed.

This document updates [RFC 1034](#) and [RFC 1035](#) to provide a clearer specification, consistent with deployed implementations.

Status of this Memo

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1. Terminology

This document uses terminology specific to the Domain Name System (DNS), descriptions of which can be found in [[I-D.ietf-dnsop-dns-terminology](#)].

In an exchange of DNS messages between two hosts, this document refers to the host sending a DNS request as the initiator, and the host sending a DNS response as the responder.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY" and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].

2. Introduction

[RFC1034] specifies an algorithm for use by responders when constructing response to a DNS QUERY. This algorithm in some cases can result in multiple RRSets being included in a single section of a DNS message, e.g. when handling CNAME resource records.

Many responder implementations have interpreted the direction to copy or store particular RRSets in the answer section of a DNS response to mean "append", treating each section as an ordered list of RRSets. Many initiators, in particular stub resolvers, are known to rely upon that interpretation when processing DNS responses received from responders.

Some DNS implementations employ algorithms in other sections that aim to optimise processing of responses received by initiators, e.g. NAPTR before SRV before A/AAAA in the additional section of a response. This behaviour has not been observed to cause any interoperability problems, and is explicitly permitted by this document.

This document updates [[RFC1035](#)] to specify that the answer section in a DNS message is an ordered list of RRSets, but that other sections may be constructed differently, and clarifies the directions provided in [[RFC1034](#)] to match the observed behaviour and expectations of deployed software.

3. Updates to [RFC 1034](#)

[RFC1034] specifies the algorithms by which sections of a DNS response are constructed by a responder. For example, step 3 of the algorithm described in [\[RFC1034\] section 4.3.2](#) contains the direction "copy all RRs which match QTYPE into answer section".

In this case, and in all other cases where [\[RFC1034\]](#) specifies that particular RRSets be included in the answer section of a DNS message, the section **MUST** be treated as an ordered list of RRSets. When it is necessary to include new RRSets in a section of a DNS message that is under construction, those RRSets **MUST** be appended. The receiver of a DNS message **MAY** refuse to process DNS messages that have been constructed differently.

When constructing other sections of a DNS message, each section **MAY** be treated as a non-ordered list, and a receiver of a DNS message **MUST NOT** reject a DNS message on the basis of the order of RRSets in those sections.

4. Updates to [RFC 1035](#)

In a DNS message, the answer section MUST be considered to be an ordered set of RRSets; all other sections MUST be considered to be a non-ordered set.

DNS implementations MUST construct each section in a DNS response according to the algorithms specified in [[RFC1034](#)], as clarified in [Section 3](#) of this document.

5. Security Considerations

The recommendations contained in this document have no known security implications.

6. IANA Considerations

This document has no IANA actions.

[7.](#) Acknowledgements

The contributions of Mark Andrews and Paul Vixie to this document are acknowledged.

8. References

8.1. Normative References

- [RFC1034] Mockapetris, P., "Domain names - concepts and facilities", STD 13, [RFC 1034](#), DOI 10.17487/RFC1034, November 1987, <<http://www.rfc-editor.org/info/rfc1034>>.
- [RFC1035] Mockapetris, P., "Domain names - implementation and specification", STD 13, [RFC 1035](#), DOI 10.17487/RFC1035, November 1987, <<http://www.rfc-editor.org/info/rfc1035>>.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<http://www.rfc-editor.org/info/rfc2119>>.

8.2. Informative References

- [I-D.ietf-dnsop-dns-terminology]
Hoffman, P., Sullivan, A., and K. Fujiwara, "DNS Terminology", [draft-ietf-dnsop-dns-terminology-05](#) (work in progress), September 2015.

[Appendix A.](#) Editorial Notes

This section (and sub-sections) to be removed prior to publication.

[A.1.](#) Venue

An appropriate forum for discussion of this draft is the dnsop working group.

[A.2.](#) Change History

[A.2.1.](#) [draft-jabley-dnsop-ordered-answers-00](#)

Initial draft circulated for comment.

Author's Address

Joe Abley
Dyn, Inc.
103-186 Albert Street
London, ON N6A 1M1
Canada

Phone: +1 519 670 9327

Email: jabley@dyn.com