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DNS over HTTP resolver announcement Using DHCP or Router Advertisements

draft-peterson-doh-dhcp-01

Abstract

This specification describes a DHCP option and Router Advertisement (RA) extension to inform clients of the presence of a DNS over HTTP (DoH) service to be used for DNS queries.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on April 22, 2020.

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1. Introduction

DHCPv4 [RFC2131], DHCPv6 [RFC3646], and IPv6 Router Announcements [RFC8106] all provide means to inform clients of available resolvers using the incumbent DNS protocol for querying, however there is no means of specifying alternate protocols to perform DNS queries.

2. Conventions and Definitions

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.

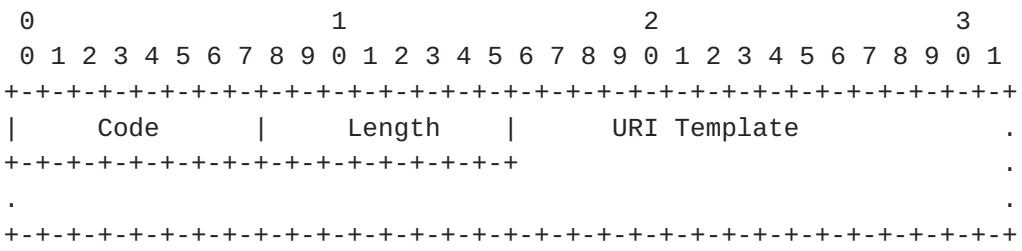
3. The DoH Option

The DoH DHCP/RA option informs the client that a DoH service is available for use for answering DNS queries. In order to support multiple "classes" of clients, the network operator can provide the URI template [RFC6570] which describes how a client can construct the URL to use for resolution. Whilst DoH servers may support multiple URI Templates, only one template MUST be transmitted.

URI Templates that contain a host name SHOULD only be sent where a DHCP server or Router provide name servers, as name resolution of any host name in the template will require clients to use the non-DoH servers provided or manual configuration. URI Templates that are over 255 bytes in length MUST implement long option encoding as defined in [RFC3396].

3.1. IPv4 DHCP Option

The format of the IPv4 DoH DHCP option is shown below.



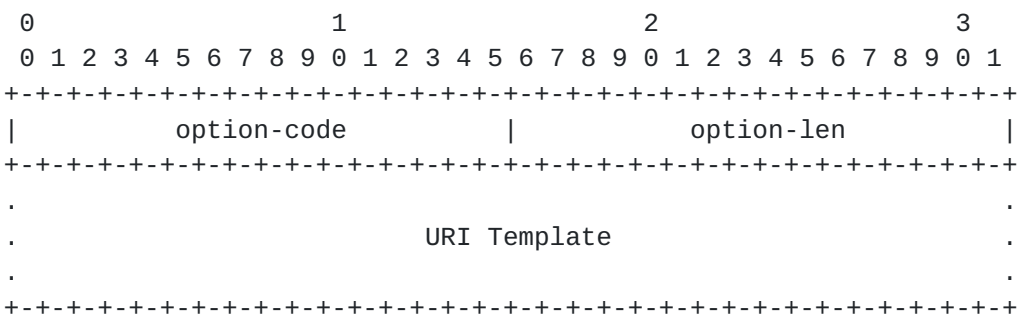
Code: The DoH DHCPv4 option (one octet).

Length: The length, in octets of the URI template.

URI Template: The DoH server available, encoded following the rules of [RFC3986].

3.2. IPv6 DHCP Option

The format of the IPv6 DHCP option is shown below.



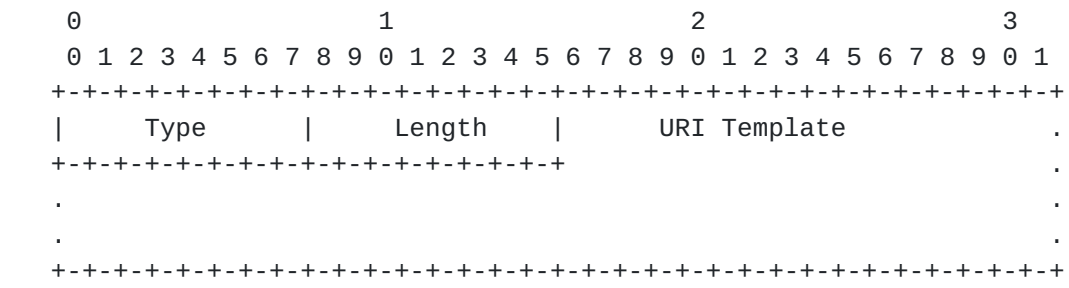
option-code: TODO (two octets)

option-len: The length, in octects of the URI Template.

URI Template: The DoH server

3.3. The DoH IPv6 RA Option

The format of the DoH Router Advertisement option is shown below.



Type: TODO (one octet)

Length: 8-bit unsigned integer representing the entire length of all fields, in units of 8 bytes.

URI Template: The DoH server available for use. This should be padded with NULL (0x0) to make the total option length (including the Type and Length fields) a multiple of 8 bytes.

4. Security Considerations

An attacker with the ability to inject DHCP messages could include this option and present a malicious resolver.

TODO: Further risk and threat assessments.

5. IANA Considerations

TODO: This section must be updated after assignments have been issued.

This document requires the assignment of an option code assigned under the "BOOTP Vendor Extensions and DHCP Options" [bootp-registry], in addition to an option code assigned under the "Option Codes" registry under DHCPv6 parameters [dhcpv6-registry].

Also, an assignment for an IPv6 RA Option Type from the "IPv6 Neighbor Discovery Option Formats" registry under ICMPv6 paramters [icmpv6-registry].

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>.

[RFC3396] Lemon, T. and S. Cheshire, "Encoding Long Options in the Dynamic Host Configuration Protocol (DHCPv4)", RFC 3396, DOI 10.17487/RFC3396, November 2002, <https://www.rfc-editor.org/info/rfc3396>.

[RFC3986] Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifier (URI): Generic Syntax", STD 66, RFC 3986, DOI 10.17487/RFC3986, January 2005, <https://www.rfc-editor.org/info/rfc3986>.

[RFC6570] Gregorio, J., Fielding, R., Hadley, M., Nottingham, M., and D. Orchard, "URI Template", RFC 6570, DOI 10.17487/RFC6570, March 2012, <https://www.rfc-editor.org/info/rfc6570>.

[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>.

6.2. Informative References

[bootp-registry] "Dynamic Host Configuration Protocol (DHCP) and Bootstrap Protocol (BOOTP) Parameters", n.d., <http://www.iana.org/assignments/bootp-dhcp-parameters>.

[dhcpv6-registry] "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", n.d., <http://www.iana.org/assignments/dhcpv6-parameters>.

[icmpv6-registry] "Internet Control Message Protocol version 6 (ICMPv6) Parameters", n.d., <http://www.iana.org/assignments/icmpv6-parameters>.

[RFC2131] Droms, R., "Dynamic Host Configuration Protocol", RFC 2131, DOI 10.17487/RFC2131, March 1997, <https://www.rfc-editor.org/info/rfc2131>.

[RFC3646] Droms, R., Ed., "DNS Configuration options for Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", RFC 3646, DOI 10.17487/RFC3646, December 2003, <https://www.rfc-editor.org/info/rfc3646>.

[RFC8106] Jeong, J., Park, S., Beloeil, L., and S. Madanapalli, "IPv6 Router Advertisement Options for DNS Configuration", RFC 8106, DOI 10.17487/RFC8106, March 2017, <https://www.rfc-editor.org/info/rfc8106>.

Acknowledgments

TODO

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