Time Protocol Servers and Time Offset Options for IPv6 DHCP
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Abstract

The Time Protocol Servers option for IPv6 DHCP (RFC 3315) carries the IPv6 addresses of servers that a host should use for the Time Protocol (RFC 868). The Time Offset option specifies the offset in seconds from Coordinated Universal Time (UTC) that the client uses to determine its local time.

1. Introduction

The Time Protocol [1] can be used to obtain the current time from a
server. The Time Protocol Servers option defined in this document
provides an option to provide the IPv6 addresses of Time Protocol
servers to a host through DHCP [2].

The Time Offset option defined in this document provides an option to
provide the offset in seconds from UTC that the client uses to
determine its local time.

The options defined in this document are based on the IPv4 DHCP [3]
Time Server and Time Offset options [4]. This document has no effect
on IPv4 DHCP, which will continue to use the Time Server option to
provide the IPv4 addresses of RFC 868 Time Protocol servers and the
Time Offset option to provide the offset between UTC and local time
to clients.

2. Terminology

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 [5].

Throughout this document, unless indicated otherwise for clarity, the
acronym "DHCP" refers to "Dynamic Host Configuration Protocol for
IPv6" [2].

3. Format of the Time Protocol Servers option

The Time Protocol Servers option defines a list of Time Protocol
servers available to the DHCP client. The IPv6 address of each
server is included in the option. The addresses SHOULD be listed in
order of preference. The addresses MUST be unicast or anycast
addresses.

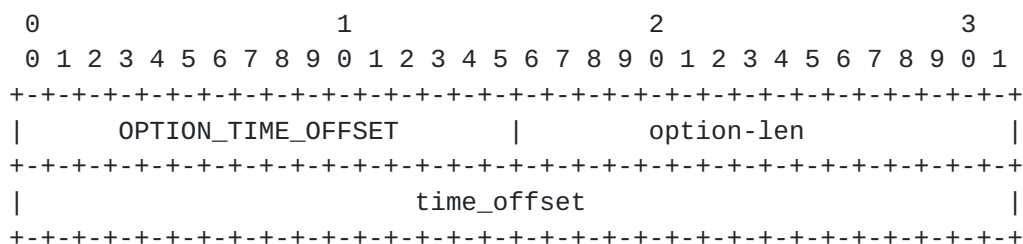The Time Protocol Servers option has the following format:

```
        0                   1                   2                   3
        0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
       |       OPTION_RFC868_SERVER     |          option-len          |
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
       |                                                               |
       |                         server-address1                       |
       |                                                               |
       |                                                               |
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
       |                                                               |
       |                         server-address2                       |
       |                                                               |
       |                                                               |
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
       .                                                               .
       .                                                               .
       .                                                               .
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
       |                                                               |
       |                         server-addressN                       |
       |                                                               |
       |                                                               |
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

    option-code        OPTION_RFC868_SERVERS (TBD).
    option-len         16 * N.
    server-address1-N  The IPv6 addresses of the Time Protocol servers.
```

4. Time Offset option

The Time Offset option specifies the offset in seconds from
Coordinated Universal Time (UTC) that the client should use to
determine its local time. The offset is expressed as a two's
complement 32-bit integer. A positive offset indicates a location
east of the zero meridian and a negative offset indicates a location
west of the zero meridian.

The Time Offset option has the following format:

```
        0                   1                   2                   3
        0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
       |        OPTION_TIME_OFFSET      |         option-len           |
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
       |                            time_offset                        |
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

```
   option-code         OPTION_TIME_OFFSET (TBD).
   option-len          4.
   server-address1-N   Offset in seconds from UTC.
```

5. Security Considerations

A server could use this option to return invalid or incorrect
addresses or valid addresses of malicious Time Protocol servers to
the client. A server could use this option to return incorrect time
offset values to the client.

Authentication of DHCP messages [2] can be used to ensure that the
contents of this option are not altered in transit between the DHCP
server and client.

6. IANA Considerations

IANA is requested to assign an option code from the IPv6 DHCP options
registry to OPTION_RFC868_SERVER and OPTION_TIME_OFFSET.

7. Normative References

[1] Postel, J. and K. Harrenstien, "Time Protocol", STD 26, RFC 868,
     May 1983.

[2] Droms, R., Bound, J., Volz, B., Lemon, T., Perkins, C., and M.
     Carney, "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)",
     RFC 3315, July 2003.

[3] Droms, R., "Dynamic Host Configuration Protocol", RFC 2131,
     March 1997.

[4] Alexander, S. and R. Droms, "DHCP Options and BOOTP Vendor
     Extensions", RFC 2132, March 1997.

[5] Bradner, S., "Key words for use in RFCs to Indicate Requirement
     Levels", BCP 14, RFC 2119, March 1997.

Authors' Addresses

   Ralph Droms
   Cisco Systems, Inc.
   1414 Massachusetts Avenue
   Boxborough, MA   01719
   USA

   Phone: +1 978.936.1674
   Email: rdroms@cisco.com

   D. R. Evans
   ARRIS International, Inc.
   7912 Fairview Road
   Boulder, CO   80303
   USA

   Phone: +1 303.494.0394
   Email: N7DR@arrisi.com

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