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Time Configuration Options for DHCPv6
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Abstract

This document describes the options for Time related configuration information in DHCPv6: SNTP Server addresses - using which the clients can synchronize their system time to that of the standard time servers; Timezone specifier - used to set the timezone of the clients.

1. Introduction

This document describes the options for time related configuration information in DHCPv6 [[1](#)].

2. Requirements

The keywords MUST, MUST NOT, REQUIRED, SHALL, SHALL NOT, SHOULD, SHOULD NOT, RECOMMENDED, MAY, and OPTIONAL, when they appear in this document, are to be interpreted as described in [RFC 2119](#) [[4](#)]

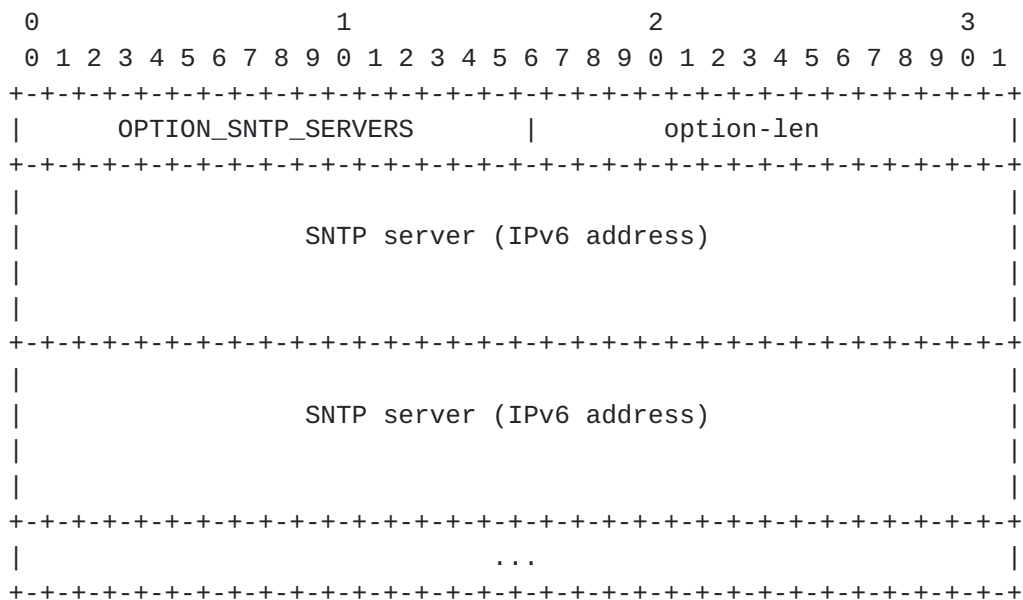
3. Terminology

This document uses terminology specific to IPv6 and DHCPv6 as defined in "Terminology" section of the DHCPv6 specification.

4. Simple Network Time Protocol (SNTP) Servers option

The Simple Network Time Protocol Servers option provides a list of one or more IPv6 addresses of SNTP [2] servers available to the client for synchronization. The SNTP servers SHOULD be listed in the order of preference.

The format of the Simple Network Time Protocol Servers option is as shown below:



option-code: OPTION_SNTP_SERVERS (tbd)

option-len: Length of the 'SNTP server' fields in octets; It must be a multiple of 16

SNTP server: IPv6 address of SNTP server

5. Timezone option

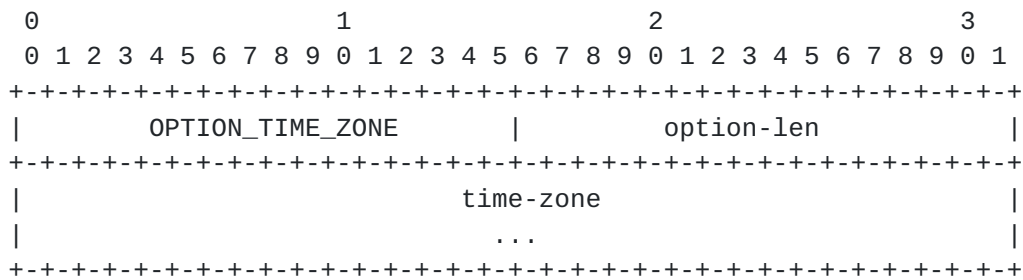
The Timezone option is used by the server to convey the timezone in which the client resides. The client is expected to set the timezone in its system on receiving this option from the server.

Vijayabhaskar A K

Expires April 16, 2004

[Page 2]

The format of the Timezone option is:



option-code: OPTION_TIME_ZONE (tbd)

option-len: Length of the 'time-zone' field in octets

time-zone: Time zone of the client in the NVT-ASCII string format.
 The format of this string is explained below:

Std[Offset[Dst[Offset],[Start[/Time],End[/Time]]]]

where '[' and ']' enclose optional fields, '|' indicates choice of exactly one of the alternatives, ',' and '/' represent literal characters present in the string.

If "Offset" is specified, then the time-zone is represented in the IEEE 1003.1 POSIX timezone format [3].

Std Three or more octets for the standard timezone (Std). Any character (or case) except a leading colon, digits, comma, minus or plus sign is allowed. If there is no Offset followed by the Std, then the timezone is not represented in IEEE 1003.1 format. In this case, the Std is treated as the index to the timezone database, for example, a file name, from where additional information about the timezone may be obtained.

Offset Indicates the value one must add to local time to arrive at UTC, of the form: [+|-]hh[:mm[:ss]]. Offset following Std is required, if the timezone is represented in IEEE 1003.1 POSIX timezone format. Digits are always interpreted as decimal number. If preceded by a '-', the timezone is east of the Prime Meridian, otherwise it is west ('+' is optional) The permissible values for hh[:mm[:ss]] are as follows:

hh 0 <= hh <= 23

mm 0 <= mm <= 60

ss 0 <= ss <= 60

Dst Three or more octets for the daylight savings timezone.
 If Dst is missing, then daylight savings time does not
 apply in this locale. If no Offset follows Dst, then
 Dst is assumed to be one hour ahead of standard time.

Any character (or case) except a leading colon, digits, comma, minus or plus sign is allowed.

- Start** Indicates the day of the year, in one of the formats indicated below, when to change to daylight savings time. The ``Time'' field (which follows immediately after a ``/'' character, if present) indicates when the change is made, in local time.
- End** Indicates the day of the year, in one of the formats indicated below, when to change back from daylight savings time. The ``Time'' field (which follows immediately after a ``/'' character, if present) indicates when the change is made, in local time.
- Time** Time has the same format as Offset, except that no leading ``-' or ``+' is permitted. The default is 02:00:00.

The day of the year needs to be given in any of the following formats:

- Jn** The julian day n , ($1 \leq n \leq 365$). Leap days are not counted.
- n** Zero-based julian day, ($0 \leq n \leq 365$). Leap days are counted so it is possible to refer to Feb 29.
- Mm.n.d** The ``d''th day, ($0 \leq d \leq 6$) of week ``n'' of month ``m'' of the year ($1 \leq n \leq 5$, $1 \leq m \leq 12$, where week 5 means last ``d'' day in month ``m'' which may occur in either the fourth or the fifth week. Week ``1'' is the first week in which the ``d'' day occurs. Day ``0'' refers Sunday, day ``1'' refers Monday and so on.

Examples:

i) Indian Standard Time zone is represented as:

IST-5:30

Here, ``IST'' refers the standard timezone and ``-5:30'' is the offset. ``-' sign in the offset says that the timezone is 5 hours and 30 minutes ahead of UTC. Absence of ``Dst'' says that daylight savings doesn't apply to this locale.

ii) For Eastern USA time zone, 1986, the timezone string is as shown below:

EST5EDT4,116/02:00:00,298/02:00:00

It says:

The standard time zone is in 5 hours behind UTC. The Daylight Savings Timezone is 4 hours behind UTC. Day light savings starts at 116 day, i.e., April 27 02:00 AM standard time and ends at 298th day, i.e., October 26 02:00 AM daylight time.

It can also be represented as:

EST5EDT,116/02:00:00,298/02:00:00

Since no offset follows the ``Dst'', daylight savings time is 1 hour ahead of standard time, thus, it is 4 hours behind UTC.

iii) Representing ii) in the non POSIX standard way is:

America/New-York

It says that the locale belongs to New-York timezone in America, which will be used as the index in to a timezone database to get more information of the timezone.

6. Usage of Timezone option

The Timezone option has the flexibility of providing timezone information in formats other than POSIX timezone, because some vendor specific databases can provide more information than POSIX Timezone string. The server SHOULD be configurable to send any of the format specified in [Section 5](#).

The timezone option can be used along with the Vendor Class Option [\[1\]](#) to make sure that the client and server agree upon the meaning of the string. For example, the clients running in different OS expect the string in different formats. Here, the Vendor Class Option [\[1\]](#) sent by clients can be used by the server to distinguish between the clients to return the proper timezone string.

If the client is not able to interpret the timezone option sent by the server, then it SHOULD ignore the option. It MAY contact alternative DHCPv6 servers to obtain the timezone information.

7. Appearance of these options

The SNTP servers and Timezone options MUST NOT appear in other than the following messages: Solicit, Advertise, Request, Renew, Rebind, Information-Request and Reply.

The option number for these options MAY appear in the Option Request Option [\[1\]](#) in the following messages: Solicit, Request, Renew, Rebind,

Information-Request and Reconfigure.

Vijayabhaskar A K

Expires April 16, 2004

[Page 5]

8. Security Considerations

The SNTP servers option may be used by an intruder DHCPv6 server to cause DHCPv6 clients to contact a rogue SNTP server, resulting in invalid synchronization of time in client and finally leading to time critical applications running inaccurately in client machine. The time accuracy can be crucial to some security algorithms. For example, it may cause expired certificates to gain a new life, making the applications running on the client machine less secure. It can even cause clients to set their time incorrectly, making them vulnerable to replay attacks in protocols that use time stamps to detect replays.

The Timezone option may be used by an intruder DHCPv6 server to assign invalid time zones, leading to timing issues for the applications running on the client machine. For example, because of wrongly configured timezone, there is a possibility that some critical applications, which are supposed to start at a particular time don't get started at that time. A delayed start of OS security update will leave the client's machine vulnerable to security attacks.

To avoid attacks through these options, the DHCPv6 client SHOULD use authenticated DHCPv6 (see "Authentication of DHCP messages" section in the DHCPv6 specification [1]).

9. IANA Considerations

IANA is requested to assign an option code to the following options from the option-code space defined in "DHCPv6 Options" section of the DHCPv6 specification [1].

Option Name	Value	Described in
OPTION_SNTP_SERVERS	tbd	Section 4.
OPTION_TIME_ZONE	tbd	Section 5.

10. Normative References

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

11. Informative References

- [2] D. Mills. Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI. Request for Comments (Informational) [2030](#), Internet Engineering Task Force, October 1996.
- [3] IEEE, "1003.1 POSIX Timezone Specification", 1988.

- [4] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

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