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[TOC](#)

## **A Dynamic Host Configuration Protocol (DHCP) based Location-to-Service Translation Protocol (LoST) Discovery Procedure draft-ietf-ecrit-dhc-lost-discovery-03.txt**

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### **Abstract**

The Location-to-Service Translation Protocol (LoST) describes an XML-based protocol for mapping service identifiers and geospatial or civic location information to service contact Uniform Resource Locators (URLs). LoST servers can be located anywhere but a placement closer to the end host, e.g., in the access network, is desirable. Such a LoST server placement provides benefits in disaster situations with intermittent network connectivity regarding the resiliency of emergency service communication.

This document describes how a LoST client can discover a LoST server using the Dynamic Host Configuration Protocol (DHCP).

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## Table of Contents

- [1.](#) Introduction
- [2.](#) Terminology
- [3.](#) Domain Name Encoding
- [4.](#) LoST Server DHCPv4 Option
- [5.](#) LoST Server DHCPv6 Option
- [6.](#) Example
- [7.](#) IANA Considerations
  - [7.1.](#) IANA Consideration for DHCPv4 Option
  - [7.2.](#) IANA Consideration for DHCPv6 Option
- [8.](#) Security Considerations
- [9.](#) Acknowledgements
- [10.](#) References
  - [10.1.](#) Normative References
  - [10.2.](#) Informative References
- [§](#) Authors' Addresses
- [§](#) Intellectual Property and Copyright Statements

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## 1. Introduction

[TOC](#)

The Location-to-Service Translation Protocol (LoST)

[\[I-D.ietf-ecrit-lost\] \(Hardie, T., Newton, A., Schulzrinne, H., and H. Tschofenig, "LoST: A Location-to-Service Translation Protocol," May 2008.\)](#) describes an XML-based protocol for mapping service identifiers and geospatial or civic location information to service contact Uniform Resource Locators (URLs).

In order to interact with a LoST server, the LoST client eventually needs to discover the server's IP address. Several mechanisms can be used to learn this address, including manual configuration. In environments where the access network itself either deploys a LoST server or knows a third party that operates a LoST server, DHCP can provide the end host with a domain name. This domain name is then used as input to the DNS-based resolution mechanism described in LoST [\[I-D.ietf-ecrit-lost\] \(Hardie, T., Newton, A., Schulzrinne, H., and H. Tschofenig, "LoST: A Location-to-Service Translation Protocol," May 2008.\)](#) that reuses the URI-enabled NAPTR specification (see [\[RFC4848\] \(Daigle, L., "Domain-Based Application Service Location Using URIs and the Dynamic Delegation Discovery Service \(DDDS\)," April 2007.\)](#)).

This document specifies a DHCPv4 and a DHCPv6 option that allows LoST clients to discover local LoST servers.

[Section 2 \(Terminology\)](#) provides terminology. [Section 3 \(Domain Name Encoding\)](#) shows the encoding of the domain name. [Section 4 \(LoST Server DHCPv4 Option\)](#) describes the DHCPv4 option while [Section 5 \(LoST Server DHCPv6 Option\)](#) describes the DHCPv6 option, with the same functionality. IANA and Security Considerations complete the document in [Section 7 \(IANA Considerations\)](#) and [Section 8 \(Security Considerations\)](#).

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## 2. Terminology

[TOC](#)

In this document, the key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" are to be interpreted as described in RFC 2119 [\[RFC2119\]](#) (Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels," March 1997.).

Within this document, we use terminology from [\[RFC5012\]](#) (Schulzrinne, H. and R. Marshall, "Requirements for Emergency Context Resolution with Internet Technologies," January 2008.) and [\[I-D.ietf-ecrit-lost\]](#) (Hardie, T., Newton, A., Schulzrinne, H., and H. Tschofenig, "LoST: A Location-to-Service Translation Protocol," May 2008.).

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## 3. Domain Name Encoding

[TOC](#)

This section describes the encoding of the domain name used in the DHCPv4 option shown in [Section 4 \(LoST Server DHCPv4 Option\)](#) and also used in the DHCPv6 option shown in [Section 5 \(LoST Server DHCPv6 Option\)](#).

The domain name is encoded according to Section 3.1 of RFC 1035 [\[RFC1035\]](#) (Mockapetris, P., "Domain names - implementation and specification," November 1987.) whereby each label is represented as a one octet length field followed by that number of octets. Since every domain name ends with the null label of the root, a domain name is terminated by a length byte of zero. The high order two bits of every length octet MUST be zero, and the remaining six bits of the length field limit the label to 63 octets or less. To simplify implementations, the total length of a domain name (i.e., label octets and label length octets) is restricted to 255 octets or less.

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[TOC](#)

## 4. LoST Server DHCPv4 Option

The LoST server DHCPv4 option carries a DNS (RFC 1035 [\[RFC1035\]](#) ([Mockapetris, P., "Domain names - implementation and specification," November 1987.](#))) fully-qualified domain name to be used by the LoST client to locate a LoST server.

The DHCP option for this encoding has the following format:

---

Code	Len	LoST Server Domain Name					
+-----+	+-----+	+-----+	+-----+	+-----+	+-----+	+-----+	+-----+
TBD1	n	s1	s2	s3	s4	s5	...
+-----+	+-----+	+-----+	+-----+	+-----+	+-----+	+-----+	+-----+

**Figure 1: LoST FQDN DHCPv4 Option**

The values s1, s2, s3, etc. represent the domain name labels in the domain name encoding. Note that the length field in the DHCPv4 option represents the length of the entire domain name encoding, whereas the length fields in the domain name encoding (see [Section 3 \(Domain Name Encoding\)](#)) is the length of a single domain name label.

Code: OPTION\_V4\_LOST (TBD1)

Len: Length of the 'LoST Server Domain Name' field in octets; variable.

LoST server Domain Name: The domain name of the LoST server for the client to use.

A DHCPv4 client MAY request a LoST server domain name in an Parameter Request List option, as described in [\[RFC2131\]](#) ([Droms, R., "Dynamic Host Configuration Protocol," March 1997.](#)).

The encoding of the domain name is described in [Section 3 \(Domain Name Encoding\)](#).

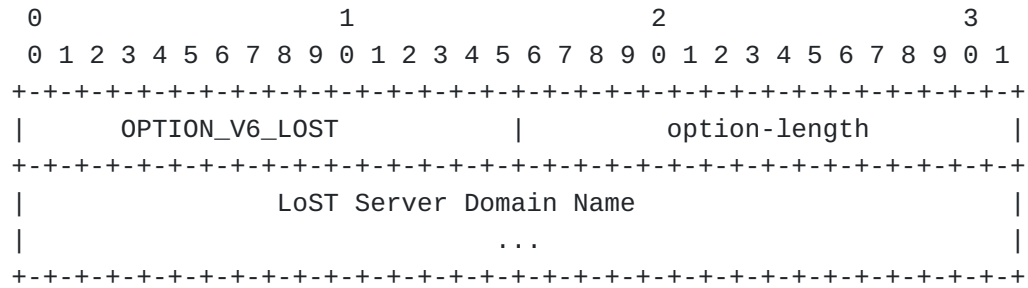
This option contains a single domain name, and as such MUST contain precisely one root label.

## 5. LoST Server DHCPv6 Option

[TOC](#)

This section defines a DHCPv6 option to carry a domain name.

The DHCPv6 option has the format shown in [Figure 2 \(DHCPv6 Option for LoST Server Domain Name List\)](#).



**Figure 2: DHCPv6 Option for LoST Server Domain Name List**

option-code: OPTION\_V6\_LOST (TBD2)

option-length: Length of the 'LoST Server Domain Name' field in octets; variable.

LoST server Domain Name: The domain name of the LoST server for the client to use.

A DHCPv6 client MAY request a LoST server domain name in an Options Request Option (ORO), as described in [\[RFC3315\] \(Droms, R., Bound, J., Volz, B., Lemon, T., Perkins, C., and M. Carney, "Dynamic Host Configuration Protocol for IPv6 \(DHCPv6\)," July 2003.\)](#).

The encoding of the domain name is described in [Section 3 \(Domain Name Encoding\)](#).

This option contains a single domain name, and as such MUST contain precisely one root label.

## 6. Example

[TOC](#)

This section shows an example of a DHCPv4 option where the DHCP server wants to offer the "example.com" domain name to the client as input to the U-NAPTR LoST discovery procedure. This domain name would be encoded as follows:

```
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|TBD1|13 | 7 | 'e'|'x'|'a'|'m'|'p'|'l'|'e'| 3 |'c'|'o'|'m'| 0 |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
```

**Figure 3: Example for a LoST FQDN DHCPv4 Option**

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## 7. IANA Considerations

[TOC](#)

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### 7.1. IANA Consideration for DHCPv4 Option

[TOC](#)

The following DHCPv4 option code for the Location-to-Service Translation Protocol (LoST) server option must be assigned by IANA:

Option Name	Value	Described in
-----		
OPTION_V4_LOST	TBD1	Section 4

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### 7.2. IANA Consideration for DHCPv6 Option

[TOC](#)

IANA is requested to assign the following DHCPv6 option codes for the Location-to-Service Translation Protocol (LoST) options:

Option Name	Value	Described in
-----		
OPTION_V6_LOST	TBD2	Section 5

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## 8. Security Considerations

[TOC](#)

If an adversary manages to modify the response from a DHCP server or insert its own response, a LoST client could be led to contact a rogue LoST server under the control of the adversary or be given an invalid address. These threats are documented in [\[RFC5069\] \(Taylor, T., Tschofenig, H., Schulzrinne, H., and M. Shanmugam, "Security Threats and Requirements for Emergency Call Marking and Mapping," January 2008.\)](#). The security considerations in [\[RFC2131\] \(Droms, R., "Dynamic Host Configuration Protocol," March 1997.\)](#), [\[RFC2132\] \(Alexander, S. and R. Droms, "DHCP Options and BOOTP Vendor Extensions," March 1997.\)](#) and [\[RFC3315\] \(Droms, R., Bound, J., Volz, B., Lemon, T., Perkins, C., and M. Carney, "Dynamic Host Configuration](#)

[Protocol for IPv6 \(DHCPv6\),” July 2003.\)](#) are applicable to this document.

With respect to the LoST security mechanisms please refer to [\[I-D.ietf-ecrit-lost\] \(Hardie, T., Newton, A., Schulzrinne, H., and H. Tschofenig, “LoST: A Location-to-Service Translation Protocol,” May 2008.\)](#).

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## 9. Acknowledgements

[TOC](#)

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## 10. References

[TOC](#)

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### 10.1. Normative References

[TOC](#)

[RFC1034]	Mockapetris, P., “ <a href="#">Domain names - concepts and facilities</a> ,” STD 13, RFC 1034, November 1987 ( <a href="#">TXT</a> ).
[RFC1035]	Mockapetris, P., “ <a href="#">Domain names - implementation and specification</a> ,” STD 13, RFC 1035, November 1987 ( <a href="#">TXT</a> ).
[RFC2119]	<a href="#">Bradner, S.</a> , “ <a href="#">Key words for use in RFCs to Indicate Requirement Levels</a> ,” RFC 2119, BCP 14, March 1997.
[RFC2131]	<a href="#">Droms, R.</a> , “ <a href="#">Dynamic Host Configuration Protocol</a> ,” RFC 2131, March 1997 ( <a href="#">TXT</a> , <a href="#">HTML</a> , <a href="#">XML</a> ).
[RFC2132]	<a href="#">Alexander, S.</a> and <a href="#">R. Droms</a> , “ <a href="#">DHCP Options and BOOTP Vendor Extensions</a> ,” RFC 2132, March 1997 ( <a href="#">TXT</a> , <a href="#">HTML</a> , <a href="#">XML</a> ).
[RFC3315]	Droms, R., Bound, J., Volz, B., Lemon, T., Perkins, C., and M. Carney, “ <a href="#">Dynamic Host Configuration Protocol for IPv6 (DHCPv6)</a> ,” RFC 3315, July 2003 ( <a href="#">TXT</a> ).
[RFC3396]	Lemon, T. and S. Cheshire, “ <a href="#">Encoding Long Options in the Dynamic Host Configuration Protocol (DHCPv4)</a> ,” RFC 3396, November 2002 ( <a href="#">TXT</a> ).

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## 10.2. Informative References

[TOC](#)

[I-D.ietf-ecrit-lost]	Hardie, T., Newton, A., Schulzrinne, H., and H. Tschofenig, " <a href="#">LoST: A Location-to-Service Translation Protocol</a> ," draft-ietf-ecrit-lost-10 (work in progress), May 2008 ( <a href="#">TXT</a> ).
[RFC4848]	Daigle, L., " <a href="#">Domain-Based Application Service Location Using URIs and the Dynamic Delegation Discovery Service (DDDS)</a> ," RFC 4848, April 2007 ( <a href="#">TXT</a> ).
[RFC5012]	Schulzrinne, H. and R. Marshall, " <a href="#">Requirements for Emergency Context Resolution with Internet Technologies</a> ," RFC 5012, January 2008 ( <a href="#">TXT</a> ).
[RFC5069]	Taylor, T., Tschofenig, H., Schulzrinne, H., and M. Shanmugam, " <a href="#">Security Threats and Requirements for Emergency Call Marking and Mapping</a> ," RFC 5069, January 2008 ( <a href="#">TXT</a> ).

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[TOC](#)

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