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A Dynamic Host Configuration Protocol (DHCP) based Location-to-Service Translation Protocol (LoST) Discovery Procedure
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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 desireable. 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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1. Introduction

The Location-to-Service Translation Protocol (LoST) [I-D.ietf-ecrit-lost] 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] that reuses the URI-enabled NAPTR specification (see [RFC4848]).

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

Section 2 provides terminology. Section 3 shows the encoding of the domain name. Section 4 describes the DHCPv4 option while Section 5 describes the DHCPv6 option, with the same functionality. IANA and Security Considerations complete the document in Section 7 and Section 8.

2. Terminology

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].

Within this document, we use terminology from [RFC5012] and [I-D.ietf-ecrit-lost].

3. Domain Name Encoding

This section describes the encoding of the domain name used in the DHCPv4 option shown in Section 4 and also used in the DHCPv6 option shown in Section 5.

The domain name is encoded according to Section 3.1 of RFC 1035 [RFC1035] 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.

4. LoST Server DHCPv4 Option

The LoST server DHCPv4 option carries a DNS (RFC 1035 [RFC1035]) 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) 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].

The encoding of the domain name is described in Section 3.

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

5. LoST Server DHCPv6 Option

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

The DHCPv6 option has the format shown in Figure 2.

```
     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_V6_LOST           |         option-length         |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                LoST Server Domain Name                        |
    |                              ...                              |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

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].

The encoding of the domain name is described in Section 3.

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

6. Example

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

7. IANA Considerations

7.1. IANA Consideration for DHCPv4 Option

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

7.2. IANA Consideration for DHCPv6 Option

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

8. Security Considerations

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]. The security considerations in [RFC2131], [RFC2132] and [RFC3315] are applicable to this document.

With respect to the LoST security mechanisms please refer to [I-D.ietf-ecrit-lost].

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10. References

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