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Carrying Geo Coordinates Information In IS-IS  
draft-shen-isis-geo-coordinates-00

## Abstract

This document defines a new IS-IS TLV which carries the Geo Coordinates information of the system. The Geo Coordinates information can be used by IS-IS routing or by any applications.

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IS-IS Geo Location

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[1.](#) Introduction

The IS-IS routing protocol defined by [[ISO10589](#)] has been widely deployed in various networks. The Geo Coordinates information can be useful, particularly within the wide area networks for numerous applications. Similar to the Dynamic Hostname defined in [[RFC5301](#)], the Geo Coordinates can also be used for network management purposes.

In the case of BGP speakers setting the outbound "MED" value in route advertisement to neighbors, a local policy can be defined to evaluate the physical location or physical region of the BGP nexthops.

In the case of IGP point-to-multiple operations [[I-D.lamparter-isis-p2mp](#)], [[RFC6845](#)], the local system configuration can be greatly simplified if the outbound metric to remote neighbors can be generated automatically based on this Geo Location of the IGP neighbors.

In the application where IS-IS neighbors are on the same "sub-net" but over the WAN network, this Geo Location information may be used for equal-cost or unequal-cost load sharing on the local system. This enables location based operation on anycast IP prefixes and DMZ gateways across the WAN environment.

For the traffic matrix using the Geo Coordinates within the routing domain, instead of a collection of IP nexthops which might be translated into locations, this enables automatic region to region traffic pattern aggregation.

This document describes the IS-IS protocol carrying the Geo Coordinates information in a new TLV. This TLV can be distributed within the node's LSP or inside the IIH PDU. The exact mechanism

each application uses this information is outside the scope of this document.

### 1.1. Requirements Language

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 [RFC 2119](#) [[RFC2119](#)].

## 2. Packet Encoding

This Geo Coordinates extension introduces one TLV for IS-IS LSP PDU and for Hello (IIH) PDU. The code of the TLV is described in the IANA Considerations section of the document. The fields specify the location of the system using WGS-84 (World Geodetic System) reference coordinate system [[WGS84](#)]. The Geo Coordinates encoding is adapted from the format in [[I-D.ietf-lisp-lcaf](#)]. The value of the Geo Coordinates TLV consists of the following fields:

```

      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
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|N|      Latitude Degrees      |      Minutes      |      Seconds      |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|E|      Longitude Degrees     |      Minutes      |      Seconds      |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                               |      Altitude      |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                               |      .. Optional Sub-TLVs
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

Type: TBD. 8 bits value, to be assigned by IANA.

Length: Variable. 8 bits value. The mandatory part is 12 octets.

N: When set to 1 means North, otherwise South.

Latitude Degrees: Valid values range from 0 to 90 degrees above or below the equator (northern or southern hemisphere, respectively).

Latitude Minutes: Valid values range from 0 to 59.

Latitude Seconds: Valid values range from 0 to 59.

E: When set to 1 means East, otherwise West.

Longitude Degrees: Value values are from 0 to 180 degrees right or left of the Prime Meridian.

Longitude Minutes: Valid values range from 0 to 59.

Longitude Seconds: Valid values range from 0 to 59.

Altitude: Height relative to sea level in meters. This is a signed integer meaning that the altitude could be below sea level. A value of 0x7fffffff indicates no Altitude value is encoded.

Optional Sub-TLV: Not defined in this document, for future extension related to the Geo Coordinates information.

### [3.](#) Operations

This IS-IS Geo Coordinates TLV can be optionally included in the node's LSP of fragment number zero. This TLV can also be optionally included in the IIH PDU. This can be useful when the application is setting the outbound p2mp circuit metric based on the neighbor's location. This can also be used in the Spine-Leaf extension [[I-D.shen-isis-spine-leaf-ext](#)] where there is no LSP being flooded into the leaf nodes.

The Geo location information can be statically provisioned on the system, or it can be dynamically acquired from the GPS capable device on the system.

#### [4.](#) IANA Considerations

A new TLV codepoint is defined in this document and needs to be assigned by IANA from the "IS-IS TLV Codepoints" registry. It is referred to as the Geo Coordinates TLV. This TLV is only to be optionally inserted in the LSP PDU and the IIH PDU. This document does not propose any sub-TLV out of this Geo Coordinates TLV.

Value	Name	IIH	LSP	SNP	Purge
-----	-----	---	---	---	-----
TBD	Geo Coordinates	y	y	n	n

#### [5.](#) Security Considerations

Security concerns for IS-IS are addressed in [[ISO10589](#)], [[RFC5304](#)], [[RFC5310](#)], and [[RFC7602](#)]. This extension does not raise additional security issues.

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#### [6.](#) Acknowledgments

The encoding of the Geo location is adapted from the "Geo Coordinate LISP Canonical Address Format" specified in the "LISP Canonical Address Format (LCAF)". We would like to thank the authors of that document.

#### [7.](#) Document Change Log

- o Initial version of the draft is published in February 2016.

#### [8.](#) References

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