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E. Chen
N. Shen
Cisco Systems
R. Raszuk
Bloomberg LP
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Carrying Geo Coordinates in BGP
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Abstract

In this document we specify a new BGP capability - the Geo Coordinate Capability, and a new BGP attribute - the Geo Coordinate Attribute, for carrying the Geo Coordinate information in BGP.

[1.](#) Introduction

There are several potential applications as described hereby for the physical location information of BGP speakers [[RFC4271](#)] in a network.

In an "overlay network" without IGPs or where the "underlay network" belongs to a different administrative domain (e.g., using the BGP Tunnel Encapsulation Attribute [[I-D.ietf-idr-tunnel-encaps](#)]), the geographical location of the BGP speaker that sources the route in the network can be used to derive some rough sense of "distance" as a parameter in lieu of the IGP-metric in BGP path selection.

In the applications of "Service Function Chaining" [[RFC7665](#)], the Geo location information of the Service Function Forwarders or the Service Nodes, can help the design of Service Function Paths with better traffic pattern and a lower latency.

The knowledge of the physical location of BGP speakers can also be used to simplify the operational procedures for setting the outbound "MED" value in route advertisement.

In this document we specify a new BGP capability - the Geo Coordinate Capability, and a new BGP attribute - the Geo Coordinate Attribute, for carrying the Geo Coordinate information in BGP.

[1.1.](#) Specification of Requirements

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](#)].

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2. The Geo Coordinate Capability

The Geo Coordinate Capability is a new BGP capability [[RFC5492](#)]. The Capability Code for this capability is specified in the "IANA Considerations" section of this document. The Capability Length is 12 octets. The Capability Value consists of the following fields that specify the location of the speaker using the WGS-84 (World Geodetic System) reference coordinate system [[WGS-84](#)]:

[illegible]

where:

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.

The encoding of the Geo location is adapted from the "Geo Coordinate LISP Canonical Address Format" [[I-D.ietf-lisp-lcaf](#)].

3. The Geo Coordinate Attribute

The Geo Coordinate Attribute is an optional, transitive BGP attribute [RFC4271]. The type of the attribute is described in the IANA Considerations section, and the value of the attribute consists of one or more of the tuple encoded as shown below:

[illegible]

where the "AS number" and the "BGP Identifier" fields contain the AS number and the BGP Identifier [RFC4271, [RFC6286](#)] of the BGP speaker that sources or advertises the route, and the remaining fields specify the location of the speaker using the WGS-84 (World Geodetic System) reference coordinate system [[WGS-84](#)]. These location related fields are hereby given the same description as the ones in the "Geo Coordinate Capability" section.

4. Operations

The Geo Coordinate Capability may be used by a BGP speaker to advertise its physical location to its neighbor. When an IGP (such as OSPF or ISIS) is involved and accessible, it could be advantageous for the Geo Coordinates to be carried in the IGP instead of in the OPEN for internal BGP ("IBGP") sessions.

When a BGP speakers receives the Geo Coordinate Capability in the OPEN message from a neighbor, it is up to the speaker and its local policy to decide how the information would be used.

The Geo Coordinate Attribute may be used by a BGP speaker to encode the physical location of the speaker in an UPDATE message. In the case that a route already contains the attribute, the speaker MAY prepend its AS number, its BGP Identifier, and the Geo coordinate information in the value field of the attribute, and adjust the

attribute length accordingly. Depending on local policy, the speaker MAY also override the existing Geo Coordinate Attribute with its own information in route advertisement.

When a BGP speakers receives the Geo Coordinate Attribute in an UPDATE message from a neighbor, it is up to the speaker and the local policy to decide how this attribute would be handled and used.

The Geo Coordinate Capability in an OPEN message does not have any impact on how the Geo Coordinate Attribute in an UPDATE message (carried over the same session) would be handled.

5. Error Handling

The Geo Coordinate Attribute in an UPDATE message is considered malformed if the attribute length is not a non-zero multiple of 20.

An UPDATE message with a malformed Geo Coordinate Attribute SHALL be handled using the approach of "attribute discard" [[RFC7606](#)].

6. IANA Considerations

This documents specifies a BGP capability, the Geo Coordinate Capability, The capability type needs to be allocated by IANA.

This documents specifies a BGP attribute, the Geo Coordinate Attribute. The attribute type needs to be allocated by IANA.

7. Security Considerations

This extension to BGP does not change the underlying security issues.

8. 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.

9. References

9.1. Normative References

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10. Authors' Addresses

Enke Chen
Cisco Systems
170 W. Tasman Drive
San Jose, CA 95134
USA

Email: enkechen@cisco.com

Naiming Shen
Cisco Systems
170 W. Tasman Drive
San Jose, CA 95134
USA

Email: naiming@cisco.com

Robert Raszuk
Bloomberg LP
731 Lexington Ave
New York City, NY 10022
USA

Email: robert@raszuk.net