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Large BGP Communities
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Abstract

This document describes the Large BGP Community attribute, an extension to BGP (RFC 4271). This attribute provides a mechanism to signal opaque information within separate namespaces to aid in routing management. The attribute is suitable for use in 4-byte ASNs (RFC 6793).

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 [RFC2119].

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on April 4, 2017.

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1. Introduction

BGP implementations typically support a routing policy language to control the distribution of routing information. Network operators attach BGP communities to routes to identify intrinsic properties of these routes. These properties may include information such as the route origin location, or specification of a routing policy action to be taken, or one that has been taken, and may apply to an individual route or to a group of routes. Because BGP communities are optional transitive BGP attributes, BGP communities may be acted upon or otherwise used by routing policies in other Autonomous Systems (ASes) on the Internet.

[RFC1997] BGP Communities Attributes are four-octet values split into two individual two-octet words. The most significant word is usually

interpreted as an Autonomous System Number (ASN) and the least significant word is a locally defined value whose meaning is assigned by the operator of the Autonomous System in the most significant word.

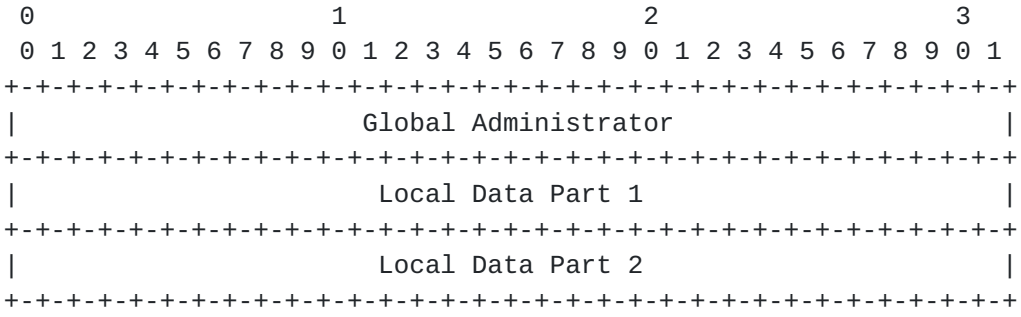
Since the adoption of four-octet ASNs [RFC6793], the BGP Communities Attribute can no longer accommodate this encoding, as the specification in [RFC1997] contains only four octets. This does not allow operators to specify any locally significant values.

To address these shortcomings, this document defines a Large Community BGP Attribute encoded as one or more 12-octet values, each consisting of a four-octet ASN and two four-octet operator-defined values, each of which can be used to denote properties or actions significant to that ASN.

2. Large BGP Communities Attribute

This document creates the Large Communities BGP path attribute as an optional transitive attribute of variable length. All routes with the Large Communities attribute belong to the community specified in the attribute.

The attribute consists of one or more 12-octet values. Each 12-octet Large Communities value represents three 4-octet values, as follows:



Global Administrator: A four-octet namespace identifier. This SHOULD be an Autonomous System Number assigned by IANA.

Local Data Part 1: A four-octet operator-defined value.

Local Data Part 2: A four-octet operator-defined value.

The Global Administrator field is intended to allow different Autonomous Systems to define Large Communities without collision. Implementations MUST allow the operator to specify any value for the Global Administrator field.

There is no significance to the order in which Large Communities are encoded in a path attributes field and a receiving speaker MAY retransmit them in an order different from which it received them.

Duplicate Large Communities SHOULD NOT be transmitted. A receiving speaker SHOULD silently remove duplicate Large Communities from a BGP UPDATE message.

There are no routing semantics implied by the Global Administrator field.

3. Aggregation

If a range of routes is aggregated and the resulting aggregates attribute section does not carry the ATOMIC_AGGREGATE attribute, then the resulting aggregate should have a Large Communities path attribute which contains all of the large communities from all of the aggregated routes.

4. Textual Representation

BGP Communities [RFC1997] are usually represented in routing policy languages as two individual two-octet unsigned integers separated by a colon; for example, 64496:12345.

BGP Large Communities implementations MUST represent Large Communities in a manner similar to their representation of BGP Communities [RFC1997]. Large Communities MUST be represented as three separate four-octet unsigned integers in decimal format with no leading zeros. These integers MUST NOT be omitted, even when zero. For example, 64496:4294967295:2 or 64496:0:0.

Vendors MAY provide other textual representations. For example, a vendor's routing policy language may use a separator other than a colon or may require keywords or characters prepending or postpending the Large Communities attribute. Such differences are permitted. However, each implementation MUST make a representation available that depicts the integers in decimal and in the following order: Global Administrator, Local Data Part 1, Local Data Part 2.

5. Reserved Large BGP Community values

The Large BGP Community attribute values in the following ranges are reserved:

```
         0:0:0 -          0:4294967295:4294967295
     65535:0:0 -      65535:4294967295:4294967295
4294967295:0:0 - 4294967295:4294967295:4294967295
```

6. Error Handling

The error handling of Large Communities is as follows:

- A Large Communities BGP Path Attribute with a length of zero MUST be ignored upon receipt and removed when sending.

- A Large Communities attribute SHALL be considered malformed if its length is not a non-zero multiple of 12 bytes.

- A BGP UPDATE message with a malformed Large Communities attribute SHALL be handled using the approach of "treat-as-withdraw" as described in section 2 [RFC7606].

The BGP Large Communities Global Administrator field may contain any value, and a Large Communities attribute MUST NOT be considered malformed if the Global Administrator field contains an unallocated, unassigned or reserved ASN or is set to one of the reserved Large BGP Community values defined in Section 5.

A receiving speaker MUST NOT consider duplicate Large Communities attributes in a BGP UPDATE message to be malformed.

7. Security Considerations

This extension to BGP has similar security implications as BGP Communities [RFC1997] and BGP Extended Communities [RFC4360].

This document does not change any underlying security issues associated with any other BGP Communities mechanism. Specifically, an AS relying on the Large BGP Community attribute carried in BGP must have trust in every other AS in the path, as any intermediate Autonomous System in the path may have added, deleted or altered the Large BGP Community attribute. Specifying the mechanism to provide such trust is beyond the scope of this document.

Network administrators should note the recommendations in Section 11 of BGP Operations and Security [RFC7454].

8. Implementation status - RFC EDITOR: REMOVE BEFORE PUBLICATION

This section records the status of known implementations of the protocol defined by this specification at the time of posting of this Internet-Draft, and is based on a proposal described in [RFC7942]. The description of implementations in this section is intended to assist the IETF in its decision processes in progressing drafts to RFCs. Please note that the listing of any individual implementation here does not imply endorsement by the IETF. Furthermore, no effort

has been spent to verify the information presented here that was supplied by IETF contributors. This is not intended as, and must not be construed to be, a catalog of available implementations or their features. Readers are advised to note that other implementations may exist.

As of today these vendors have produced an implementation of Large BGP Community:

- Cisco IOS XR
- ExaBGP
- GoBGP
- BIRD

The latest implementation news is tracked at http://largebgpcommunities.net/ [1].

9. IANA Considerations

IANA has assigned value 30 (LARGE_COMMUNITY Attribute) in the "BGP Path Attributes" sub-registry under the "Border Gateway Protocol (BGP) Parameters" registry.

10. Acknowledgments

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11. References

11.1. Normative References

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[RFC6793] Vohra, Q. and E. Chen, "BGP Support for Four-Octet Autonomous System (AS) Number Space", RFC 6793, DOI 10.17487/RFC6793, December 2012, <http://www.rfc-editor.org/info/rfc6793>.

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11.2. Informative References

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[RFC7942] Sheffer, Y. and A. Farrel, "Improving Awareness of Running Code: The Implementation Status Section", BCP 205, RFC 7942, DOI 10.17487/RFC7942, July 2016, <http://www.rfc-editor.org/info/rfc7942>.

11.3. URIs

[1] https://largebgpcommunities.net

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