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J. Heitz, Ed.
Cisco
J. Snijders, Ed.
NTT
K. Patel
Arrcus
I. Bagdonas
Equinix
A. Simpson
Nokia
N. Hilliard
INEX

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Large BGP Communities
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Abstract

This document describes the Large BGP Communities attribute, an extension to BGP-4. This attribute provides a mechanism to signal opaque information within separate namespaces to aid in routing management. The attribute is suitable for use with four-octet ASNs.

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 May 3, 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 two-octet words. The most significant word is 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.

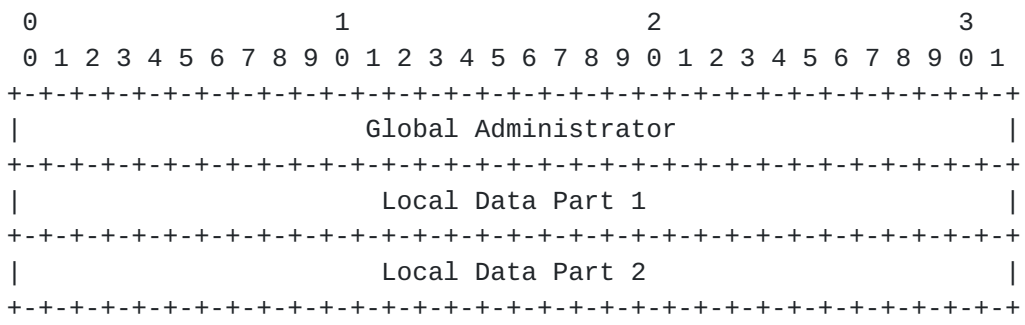
Since the adoption of four-octet ASNs [RFC6793], the BGP Communities attribute can no longer accommodate the above encoding, as a two-octet word cannot fit a four-octet ASN. The BGP Extended Communities attribute [RFC4360] is also unsuitable, as the protocol limit of six octets cannot accommodate both a four-octet Global Administrator value and a four-octet Local Administrator value, which precludes the common operational practice of encoding a target ASN in the Local Administrator field.

To address these shortcomings, this document defines a Large BGP Communities attribute encoded as one or more twelve-octet values, each consisting of a four-octet Global Administrator field and two four-octet operator-defined fields, each of which can be used to denote properties or actions significant to the operator of the Autonomous System assigning the values.

2. Large BGP Communities Attribute

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

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



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

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 BGP 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 BGP Communities are encoded in the BGP path attribute payload. A BGP speaker can transmit them in any order.

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

3. Aggregation

If a range of routes is aggregated, then the resulting aggregate should have a Large BGP Communities attribute which contains all of the Large BGP Communities attributes from all of the aggregated routes.

4. Canonical Representation

Large BGP Communities MUST be represented as three separate unsigned integers in decimal notation in the following order: Global Administrator, Local Data 1, Local Data 2. Numbers MUST NOT contain leading zeros; a zero value MUST be represented with a single zero. For example: 64496:4294967295:2, 64496:0:0, or (64496, 111, 222).

5. Reserved Large BGP Community values

The following Global Administrator values are reserved: 0 (the first ASN) [RFC7607], 65535 (UINT16_MAX) and 4294967295 (the last ASN) [RFC7300]. Operators SHOULD NOT use these Global Administrator values.

Although this document does not define any Special-Use Large BGP Communities, the Global Administrator values specified above could be used if there is a future need for them.

6. Error Handling

The error handling of Large BGP Communities is as follows:

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

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

The Large BGP Communities Global Administrator field may contain any value, and a Large BGP 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.

7. Security Considerations

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

This document does not change any underlying security issues associated with any other BGP Communities mechanism. Specifically, an AS relying on the Large BGP Communities 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 Communities 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 Communities:

- Cisco IOS XR

- ExaBGP

- GoBGP
- BIRD
- OpenBGPD
- pmacct
- Quagga

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

9. IANA Considerations

IANA has made an Early Allocation of the value 32 (LARGE_COMMUNITY) in the "BGP Path Attributes" registry under the "Border Gateway Protocol (BGP) Parameters" group and is now asked to make that Permanent.

10. Contributors

The following people contributed significantly to the content of the document:

John Heasley
NTT Communications

Email: heas@shrubbery.net

11. Acknowledgments

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12. References

12.1. Normative References

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12.2. 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>.

12.3. URIs

[1] http://largebgpcommunities.net

Authors' Addresses

Jakob Heitz (editor)
Cisco
170 West Tasman Drive
San Jose, CA 95054
USA

Email: jheitz@cisco.com

Job Snijders (editor)
NTT Communications
Theodorus Majofskistraat 100
Amsterdam 1065 SZ
The Netherlands

Email: job@ntt.net

Keyur Patel
Arrcus, Inc

Email: keyur@arrcus.com

Ignas Bagdonas
Equinix
London
UK

Email: ibagdona.ietf@gmail.com

Adam Simpson
Nokia
600 March Road
Ottawa Ontario K2K 2E6
Canada

Email: adam.1.simpson@nokia.com

Nick Hilliard
INEX
4027 Kingswood Road
Dublin 24
IE

Email: nick@inex.ie