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BGP Large Communities Attribute

Abstract

This document describes the BGP Large 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 all Autonomous System Numbers (ASNs) including four-octet ASNs.

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 7841.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc8092.

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1. Introduction

BGP [RFC4271] implementations typically support a routing policy language to control the distribution of routing information. Network operators attach BGP communities to routes to associate particular properties with 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 is applied to all routes contained in a BGP Update Message where the Communities Attribute is included. 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.

A BGP Communities attribute is a variable-length attribute consisting of a set of one or more four-octet values, each of which specify a community [RFC1997]. Common use of the individual values of this attribute type split this single 32-bit value into two 16-bit values. 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 AS 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. The six-octet length of the Extended Community value precludes the common operational practice of encoding four-octet ASNs in both the Global Administrator and the Local Administrator sub-fields.

To address these shortcomings, this document defines a BGP Large Communities attribute encoded as an unordered set of 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 AS assigning the values.

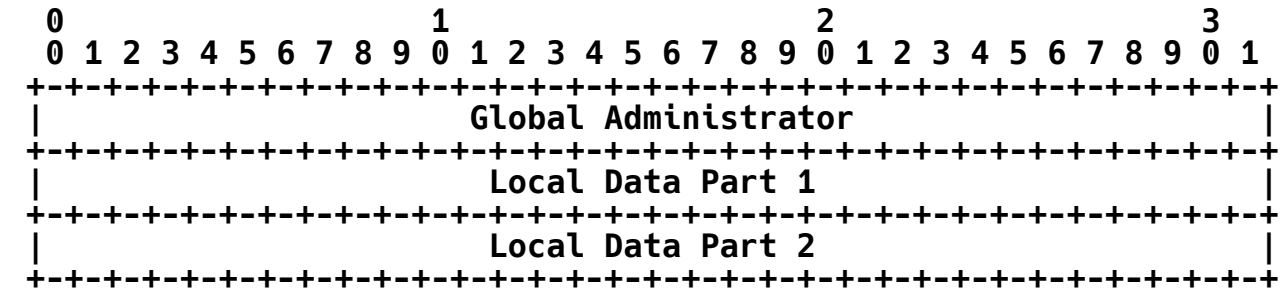
2. Requirements Language

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].

3. BGP Large Communities Attribute

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

Each BGP Large Community value is encoded as a 12-octet quantity, as follows:



Global Administrator: A four-octet namespace identifier.

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 ASes to define BGP Large Communities without collision. This field SHOULD be an ASN, in which case the Local Data Parts are to be interpreted as defined by the owner of the ASN. The use of Reserved ASNs (0 [RFC7607], 65535 and 4294967295 [RFC7300]) is NOT RECOMMENDED.

There is no significance to the order in which twelve-octet Large Community Attribute values are encoded in a Large Communities attribute, A BGP speaker can transmit them in any order.

Duplicate BGP Large Community values MUST NOT be transmitted. A receiving speaker MUST silently remove redundant BGP Large Community values from a BGP Large Community attribute.

4. Aggregation

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

5. Canonical Representation

The canonical representation of BGP Large Communities is 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. Each number is separated from the next by a single colon. For example: 64496:4294967295:2, 64496:0:0.

BGP Large Communities SHOULD be represented in the canonical representation.

6. Error Handling

The error handling of BGP Large Communities is as follows:

- A BGP Large Communities attribute SHALL be considered malformed if the length of the BGP Large Communities Attribute value, expressed in octets, is not a non-zero multiple of 12.
- A BGP Large Communities attribute SHALL NOT be considered malformed due to presence of duplicate Large Community values.
- A BGP UPDATE message with a malformed BGP Large Communities attribute SHALL be handled using the approach of "treat-as-withdraw" as described in Section 2 of [RFC7606].

The BGP Large Communities Global Administrator field may contain any value, and a BGP Large Communities attribute MUST NOT be considered malformed if the Global Administrator field contains an unallocated, unassigned, or reserved ASN.

7. Security Considerations

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

BGP Large Communities do not protect the integrity of each community value. Operators should be aware that it is possible for a BGP speaker to alter BGP Large Community Attribute values in a BGP Update Message. Protecting the integrity of the transitive handling of BGP Large Community attributes in a manner consistent with the intent of expressed BGP routing policies falls within the broader scope of securing BGP, and is not specifically addressed here.

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

8. IANA Considerations

IANA has assigned the value 32 (LARGE_COMMUNITY) in the "BGP Path Attributes" subregistry under the "Border Gateway Protocol (BGP) Parameters" registry.

9. References

9.1. Normative References

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