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        Generic Subtype for BGP Four-octet AS specific extended community
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Abstract

   Maintaining the current best practices with communities, ISPs and
   enterprises that are assigned a 4-octet AS number may want the BGP
   UPDATE messages they receive from their customers or peers to include
   a 4-octet AS specific BGP extended community. This document defines
   a new sub-type within the four-octet AS specific extended community
   to facilitate this practice.

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1. Introduction

Maintaining the current best practices with communities, ISPs and
enterprises that are assigned a 4-octet AS number may want the BGP
UPDATE messages they receive from their customers or peers to include
a 4-octet AS specific extended community. This document defines a
new sub-type within the four-octet AS specific extended community to
facilitate this practice.

For example, [RFC1998] describes an application of BGP community
attribute ([RFC1997]) to implement flexible routing policies for
sites multi-homed to one or multiple providers. In a two-octet AS
environment, the advertised routes are usually associated with a
community attribute that encodes the provider's AS number in the
first two octets of the community and a LOCAL_PREF value in the
second two octets of the community. The community attribute signals
the provider edge routers connected to the site to set the
corresponding LOCAL_PREF on their advertisements to the IBGP mesh.
In this way, customers can put into practice topologies like active-
backup.

When such a provider is assigned a four-octet AS number, the existing
mechanism of using communities is not sufficient since the AS portion
of the RFC 1997 community cannot exceed two bytes. The natural
alternative is to extend the same mechanism using extended
communities since it allows for encoding eight bytes of information.

[RFC5668] defines a format for a four-octet AS specific extended
community with a designated type field. That document defines two
sub-types: Four-octet specific Route Target extended community and
Four-octet specific Route Origin extended community. This document
specifies a generic sub-type for the four-octet AS specific extended
community to provide benefits such as the one cited above as the
Internet migrates to four-octet AS space.

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. Generic Sub-type Definition

```
       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
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      | 0x02 or 0x42 |     0x04      |            Global             |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |    Administrator             |       Local Administrator     |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
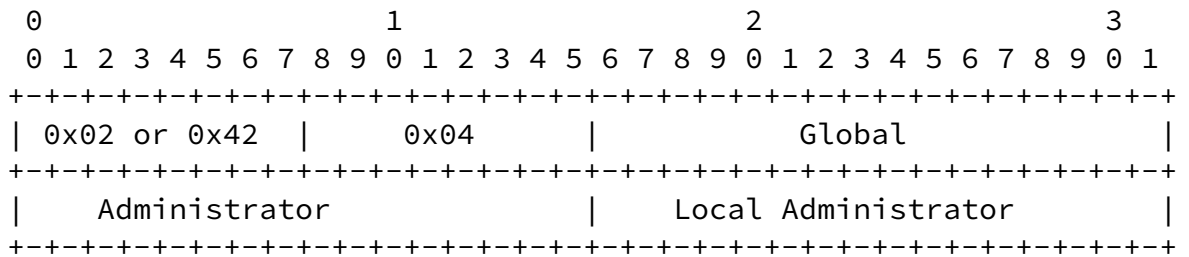
   This is an extended type with Type Field comprising of 2 octets and
   Value Field comprising of 6 octets.

   The high-order octet of this extended type is set to either 0x02 (for
   transitive communities) or 0x42 (for non-transitive communities).
   The low-order octet or the sub-type is set to 0x04.

   The Value Field consists of two sub-fields:

      Global Administrator sub-field: 4 octets

         This sub-field contains a four-octet Autonomous System number.

      Local Administrator sub-field: 2 octets

         This sub-field contains a value that can influence routing
         policies. This value has semantics that are of significance for
         the Autonomous System in the Global Administrator field.

3. Deployment Considerations

   There are situations in peering where a 4-octet AS specific generic
   extended community cannot be used.

   A speaker with a 4-octet AS may not support 4-octet extended
   communities; or the speaker may have a customer or peer that does not
   support 4-octet extended communities. In all such cases, the speaker
   may need to define an appropriate standard community value for the
   same purpose. As an example, a peer may tag its routes with a
   community that encodes AS_TRANS [RFC4893] as the first two octets.

   Similarly, as per [RFC4893], a 2-octet Autonomous System number can
   be converted into a 4-octet Autonomous System number by setting the
   two high-order octets of the 4-octet field to zero. As a
   consequence, at least in principle, an Autonomous System that has a
   2-octet AS number could use either a standard community or the
   4-octet AS specific generic extended community. This is undesirable,
   as they would be treated as different communities, even if they had

   the same values.

   Therefore, for backward compatibility with existing deployments and
   to avoid inconsistencies between standard communities and 4-octet
   extended communities, Autonomous Systems that use 2-octet Autonomous
   System numbers SHOULD use standard 2-octet communities as defined in
   RFC1997 rather than the 4-octet AS specific extended community as
   defined in this document.

4. Acknowledgments

   The authors would like to thank Paul Jakma, Bruno Decraene and Cayle
   Spandon for their useful comments on the document.

5. IANA Considerations

   This document defines a specific application of the four-octet AS
   specific extended community. IANA is requested to to assign a sub-
   type value of 0x04 for the generic four-octet AS specific extended
   community.

This document makes the following assignments for the generic four-
octet AS specific extended community:

Name   Value
----   -----
transitive generic four-octet AS specific   0x0204
non-transitive generic four-octet AS specific   0x4204

6. Security Considerations

There are no additional security risks introduced by this design.

7. References

7.1. Normative References

   [RFC1997] Chandrasekeran, R., Traina, P., and T. Li, "BGP
              Communities Attribute", RFC 1997, August 1996.

   [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate
              Requirement Levels", BCP 14, RFC 2119, March 1997.

   [RFC4893] Vohra, Q. and E. Chen, "BGP Support for Four-octet AS
              Number Space", RFC 4893, May 2007.

   [RFC5668] Rekhter, Y., Sangli, S., and D. Tappan, "4-Octet AS
              Specific BGP Extended Community", RFC 5668, October 2009.

7.2. Informative References

   [RFC1998] Chen, E. and T. Bates, "An Application of the BGP
              Community Attribute in Multi-home Routing", RFC 1998,
              August 1996.

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