        Generic Subtype for BGP Four-octet AS specific extended community
            draft-ietf-idr-as4octet-extcomm-generic-subtype-10

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.

Requirements Language

   The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
   "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" are to
   be interpreted as described in [RFC2119] only when they appear in all
   upper case. They may also appear in lower or mixed case as English
   words, without normative meaning.

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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.

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      |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
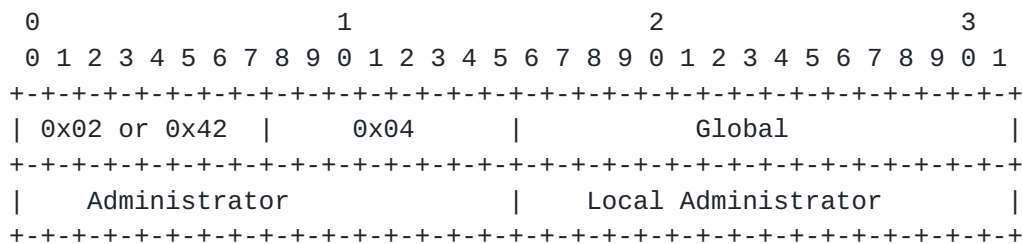
   This is an extended type with Type Field comprising of 2 octets and
   Value Field comprising of 6 octets.

   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**

   Prior revisions of this document requested IANA to make assignments
   from the Transitive Four-Octet AS Specific Extended Community Sub-
   Type registry and the Non-Transitive Four-Octet AS Specific Extended
   Community Sub-Type registry. The sub-type value of 0x04 in each of
   those registries was previously assigned:

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

   IANA is requested to deprecate these assignments.

[6](). Security Considerations

There are no additional security risks introduced by this design.

[7](). References

[7.1](). Normative References

[RFC1997] Chandra, R., Traina, P., and T. Li, "BGP Communities
           Attribute", [RFC 1997](), DOI 10.17487/RFC1997, August 1996,
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[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate
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           DOI 10.17487/RFC2119, March 1997,
           <[http://www.rfc-editor.org/info/rfc2119]()>.

[RFC4893] Vohra, Q. and E. Chen, "BGP Support for Four-octet AS
           Number Space", [RFC 4893](), DOI 10.17487/RFC4893, May 2007,
           <[http://www.rfc-editor.org/info/rfc4893]()>.

[RFC5668] Rekhter, Y., Sangli, S., and D. Tappan, "4-Octet AS
           Specific BGP Extended Community", [RFC 5668](),
           DOI 10.17487/RFC5668, October 2009,
           <[http://www.rfc-editor.org/info/rfc5668]()>.

[7.2](). Informative References

[I-D.ietf-idr-large-community]
           Heitz, J., Snijders, J., Patel, K., Bagdonas, I., and N.
           Hilliard, "BGP Large Communities", [draft-ietf-idr-large-
           community-09]() (work in progress), November 2016.

[RFC1998] Chen, E. and T. Bates, "An Application of the BGP
           Community Attribute in Multi-home Routing", [RFC 1998](),
           DOI 10.17487/RFC1998, August 1996,
           <[http://www.rfc-editor.org/info/rfc1998]()>.

[Appendix A](). Document History

This final version of the document exists only to request IANA to
deprecate its prior Extended Community assignments and provide a
historical record of the reason.

During the development of the BGP Four-octet feature [[RFC4893]()],
operators had offered their commentarythat parity was needed with
existing BGP Community practices similar to those defined in
[[RFC1998]()]. What became clear over time was that some operators

encoded an AS number as the second field of their community;
essentially, as the "target".

Since an Extended Community's Local Administrator field cannot encode
more than two octets of value, the Extended Community format was not
appropriate for addressing parity of existing operational practices.
The BGP Large Communities Feature [I-D.ietf-idr-large-community]
supplanted the work begun in this document.

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