    Export BGP community information in IP Flow Information Export (IPFIX)
               draft-ietf-opsawg-ipfix-bgp-community-02

Abstract

   This draft introduces several information elements in IPFIX
   information model [RFC7012] to enable IPFIX [RFC7011] to export the
   BGP community information, including standard community defined in
   [RFC1997], extended community defined in [RFC4360], large community
   defined in [RFC8092], community container defined in
   [I-D.ietf-idr-wide-bgp-communities].

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Table of Contents

1. Introduction

IP Flow Information Export (IPFIX) [RFC7011] provides network
administrators with traffic flow information using the information
elements (IEs) defined in [IANA-IPFIX] registries. Based on the
traffic flow information, network administrators know the amount and
direction of the traffic in their network, then they can optimize
their network when needed. For example, they can steer some flows
from the congested links to the low utilized links.

[IANA-IPFIX] has already defined the following IEs for traffic flow
information exporting in different grain: sourceIPv4Address,
sourceIPv4Prefix, destinationIPv4Address, destinationIPv4Prefix,
bgpSourceAsNumber, bgpDestinationAsNumber, bgpNextHopIPv4Address,
etc. In some circumstances, however, especially when traffic

engineering and optimization are used in the Tier 1 or Tier 2
operators' backbone networks, traffic flow information based on these
IEs is not suitable. Flow information based on IP address or IP
prefix is much more mediculous. On the contrary, flow information
based on AS number is too coarse. BGP community [RFC1997], which
describes a group of routes sharing some common properties, is
preferably used for fine granularity traffic engineering
[Community-TE] [RFC4384]. Unfortunately, [IANA-IPFIX] has no IE
defined for BGP community information, yet.

Flow information based on BGP community can be collected by a
mediator defined in [RFC6183]. Mediator is responsible for the
correlation between flow information and BGP community. However no
IEs are defined in [RFC6183] for exporting BGP community information
in IPFIX. Furthermore, to correlate the BGP community with the flow
information, mediator needs to learn BGP routes and lookup in the BGP
routing table to get the matching entry for the specific flow.
Neither BGP route learning nor routing table lookup is trivial for a
mediator. Mediator is mainly introduced to release the performance
requirement for the exporter [RFC5982]. In fact, to obtain the
information for BGP related IEs that have already been defined, such
as bgpSourceAsNumber, bgpDestinationAsNumber, and
bgpNextHopIPv4Address, etc, exporter has to hold the up-to-date BGP
routing table and look up in the BGP routing table. The exporter can
get the community information in the same procedure. So, getting BGP
community information adds no more requirement for exporter. Some
vendors have already implemented this feature in their exporters
using private IEs. So, exporter is RECOMMENDED to export the BGP
community information in IPFIX directly, other than the mediator.

This draft introduces new IEs to extend the IPFIX information model
defined in [RFC7012] to export the BGP community information,
including standard community defined in [RFC1997], extended community
defined in [RFC4360], large community defined in [RFC8092], and
community container defined in [I-D.ietf-idr-wide-bgp-communities].
Flow information, such as packetDeltaCount, octetDeltaCount [RFC7012]
etc, can then be accumulated and analysed by the collector or other
applications based on BGP community.

The IEs introduced in this document are applicable for both IPv4 and
IPv6 traffic. Both exporter and mediator can use these IEs to export
BGP community information in IPFIX.

2. Terminology

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. IEs for BGP Standard Community

   [RFC1997] defines the BGP Communities attribute, called BGP Standard
   Community in this document, which describes a group of routes sharing
   some common properties. BGP Standard Communities are treated as 32
   bit values as stated in in [RFC1997].

   In order to export BGP standard community information along with
   other flow information defined by IPFIX, three new IEs are
   introduced. One is bgpCommunity, which is used to identify that the
   value in this IE is a BGP standard community. The other two are
   bgpSourceCommunityList and bgpDestinationCommunityList, which are
   both basicList [RFC6313] of bgpCommunity, and are used to export BGP
   standard community information corresponding to a specific flow's
   source IP and destination IP respectively.

   The detailed information of the three new IEs are shown in the
   following sections.

3.1. bgpCommunity

```
  ---------------------------------------------------------------------
  |      ElementID       |            to be assigned by IANA          |
  |--------------------------------------------------------------------|
  |        Name          |               bgpCommunity                 |
  |--------------------------------------------------------------------|
  |      Data Type       |               unsigned32                   |
  |--------------------------------------------------------------------|
  | Data Type Semantics  |               identifier                   |
  |--------------------------------------------------------------------|
  |      Description      |   BGP community as defined in [RFC1997]    |
  |--------------------------------------------------------------------|
  |        Units         |                  none                      |
  |--------------------------------------------------------------------|
```

                          Figure 1: bgpCommunity

3.2. bgpSourceCommunityList

```
 --------------------------------------------------------------------
|      ElementID      |             to be assigned by IANA           |
|--------------------------------------------------------------------|
|        Name         |             bgpSourceCommunityList           |
|--------------------------------------------------------------------|
|      Data Type      |       basicList, as specified in [RFC6313]   |
|--------------------------------------------------------------------|
| Data Type Semantics |                     list                     |
|--------------------------------------------------------------------|
|      Description     | zero or more BGP communities corresponding  |
|                      | with source IP address of a specific flow   |
|--------------------------------------------------------------------|
|        Units        |                     none                     |
|--------------------------------------------------------------------|
```

                  Figure 2: bgpSourceCommunityList

3.3. bgpDestinationCommunityList

```
 --------------------------------------------------------------------
|      ElementID      |             to be assigned by IANA           |
|--------------------------------------------------------------------|
|        Name         |          bgpDestinationCommunityList         |
|--------------------------------------------------------------------|
|      Data Type      |       basicList, as specified in [RFC6313]   |
|--------------------------------------------------------------------|
| Data Type Semantics |                     list                     |
|--------------------------------------------------------------------|
|      Description     | zero or more BGP communities corresponding  |
|                      |with destination IP address of a specific flow|
|--------------------------------------------------------------------|
|        Units        |                     none                     |
|--------------------------------------------------------------------|
```

                Figure 3: bgpDestinationCommunityList

4. IEs for BGP Extended Community

   [RFC4360] defines the BGP Extended Communities attribute, which
   provides a mechanism for labeling information carried in BGP. Each
   Extended Community is encoded as an 8-octet quantity with the format
   defined in [RFC4360].

   In order to export BGP Extended Community information together with
   other flow information by IPFIX, three new IEs are introduced. The
   first one is bgpExtendedCommunity, which is used to identify that the
   value in this IE is a BGP Extended Community. The other two are
   bgpSourceExtendedCommunityList and

bgpDestinationExtendedCommunityList, which are both basicList
[RFC6313] of bgpExtendedCommunity, and are used to export the BGP
Extended Community information corresponding to a specific flow's
source IP and destination IP respectively.

The detailed information of the three new IEs are shown in the
following sections.

4.1. bgpExtendedCommunity

```
-----------------------------------------------------------------------
|      ElementID      |            to be assigned by IANA            |
|---------------------------------------------------------------------|
|        Name         |            bgpExtendedCommunity              |
|---------------------------------------------------------------------|
|      Data Type      |                octetArray                    |
|---------------------------------------------------------------------|
| Data Type Semantics |                 default                      |
|---------------------------------------------------------------------|
|                     |BGP Extended Community as defined in [RFC4360]|
|     Description      |The size of this Information Element is 8      |
|                     |octets.                                       |
|---------------------------------------------------------------------|
|        Units        |                  none                        |
|---------------------------------------------------------------------|
```

Figure 4: bgpExtendedCommunity

4.2. bgpSourceExtendedCommunityList

```
 -----------------------------------------------------------------
|      ElementID      |          to be assigned by IANA           |
|-----------------------------------------------------------------|
|        Name         |      bgpSourceExtendedCommunityList       |
|-----------------------------------------------------------------|
|      Data Type      |      basicList, as specified in [RFC6313]  |
|-----------------------------------------------------------------|
| Data Type Semantics |                   list                    |
|-----------------------------------------------------------------|
|                     |    zero or more BGP Extended Communities  |
|     Description      |    corresponding with source IP address   |
|                     |             of a specific flow            |
|-----------------------------------------------------------------|
|        Units        |                   none                    |
|-----------------------------------------------------------------|
```

Figure 5: bgpSourceExtendedCommunityList

4.3. bgpDestinationExtendedCommunityList

```
 -----------------------------------------------------------------
|      ElementID      |          to be assigned by IANA           |
|-----------------------------------------------------------------|
|        Name         |    bgpDestinationExtendedCommunityList    |
|-----------------------------------------------------------------|
|      Data Type      |      basicList, as specified in [RFC6313]  |
|-----------------------------------------------------------------|
| Data Type Semantics |                   list                    |
|-----------------------------------------------------------------|
|                     |    zero or more BGP Extended communities  |
|     Description      |  corresponding with destination IP address|
|                     |             of a specific flow            |
|-----------------------------------------------------------------|
|        Units        |                   none                    |
|-----------------------------------------------------------------|
```

Figure 6: bgpDestinationExtendedCommunityList

5. IEs for BGP Large Community

   [RFC8092] defines the BGP Large Communities attribute, which is
   suitable for use with all Autonomous System Numbers (ASNs) including
   four-octet ASNs. Each BGP Large Community is encoded as a 12-octet
   quantity with the format defined in [RFC8092].

In order to export BGP Large Community information together with
other flow information by IPFIX, three new IEs are introduced. The
first one is bgpLargeCommunity, which is used to identify that the
value in this IE is a BGP Large Community. The other two are
bgpSourceLargeCommunityList and bgpDestinationLargeCommunityList,
which are both basicList [RFC6313] of bgpLargeCommunity, and are used
to export the BGP Large Community information corresponding to a
specific flow's source IP and destination IP respectively.

The detailed information of the three new IEs are shown in the
following sections.

5.1. bgpLargeCommunity

```
-----------------------------------------------------------------------
|      ElementID      |              to be assigned by IANA           |
|---------------------------------------------------------------------|
|         Name        |                bgpLargeCommunity              |
|---------------------------------------------------------------------|
|      Data Type      |                   octetArray                  |
|---------------------------------------------------------------------|
| Data Type Semantics |                     default                   |
|---------------------------------------------------------------------|
|                     | BGP Large Community as defined in [RFC8092]   |
|     Description      | The size of this Information Element is 12     |
|                     | octets.                                       |
|---------------------------------------------------------------------|
|        Units        |                     none                      |
|---------------------------------------------------------------------
```

Figure 7: bgpLargeCommunity

5.2. bgpSourceLargeCommunityList

```
----------------------------------------------------------------------
|       ElementID       |         to be assigned by IANA             |
|--------------------------------------------------------------------|
|         Name          |       bgpSourceLargeCommunityList          |
|--------------------------------------------------------------------|
|       Data Type       |      basicList, as specified in [RFC6313]  |
|--------------------------------------------------------------------|
| Data Type Semantics   |                   list                     |
|--------------------------------------------------------------------|
|                       |     zero or more BGP Large Communities     |
|       Description      |    corresponding with source IP address    |
|                       |           of a specific flow               |
|--------------------------------------------------------------------|
|         Units         |                   none                     |
|--------------------------------------------------------------------|
```

Figure 8: bgpSourceLargeCommunityList

5.3. bgpDestinationLargeCommunityList

```
----------------------------------------------------------------------
|       ElementID       |         to be assigned by IANA             |
|--------------------------------------------------------------------|
|         Name          |     bgpDestinationLargeCommunityList       |
|--------------------------------------------------------------------|
|       Data Type       |      basicList, as specified in [RFC6313]  |
|--------------------------------------------------------------------|
| Data Type Semantics   |                   list                     |
|--------------------------------------------------------------------|
|       Description      |     zero or more BGP Large communities     |
|                       |   corresponding with destination IP address|
|                       |           of a specific flow               |
|--------------------------------------------------------------------|
|         Units         |                   none                     |
|--------------------------------------------------------------------|
```

Figure 9: bgpDestinationLargeCommunityList

6. IEs for BGP Community Container

TBD.

7. **Message Length Considerations**

   The maximum length of one IPFIX message is 65535 bytes as per
   [RFC7011] and 4096 bytes for one BGP message as per [RFC4271]. Since
   BGP communities, including standard, extended, large and container,
   are BGP path attributes distributed in update messages, the length of
   them can not exceed the length of a BGP message, i.e. 4096. So one
   IPFIX message with maximum length of 65535 has enough space to fit
   all the communities related to a specific flow, both the source IP
   and the destination IP related.

   [I-D.ietf-idr-bgp-extended-messages], however, extends the maximum
   update message size of BGP beyond 4096 bytes to 65535 bytes. BGP
   speakers that support the extended message SHOULD take care to handle
   the IPFIX message properly, such as only convey as many communities
   as possible in the IPFIX message. The collector who receives an
   IPFIX message with maximum length and BGP communities contained in
   its data set SHOULD be aware of the BGP communities may be truncated
   due to limited message space. In this case, it is RECOMMENDED to
   configure export policy on the exporter to limit the BGP communities
   to be exported, to export only some specific communities, for
   example, or not to export some communities.

   To solve this problem completely, a separate document will be
   submitted to extend the message length of IPFIX [RFC7011] to 32 bits.

8. **Security Considerations**

   This document only defines three new IEs for IPFIX. So, this
   document itself does not directly introduce security issues. The
   same security considerations as for the IPFIX Protocol Specification
   [RFC7011] and Information Model [RFC7012] apply.

   As the BGP community information is deducible by other means, there
   are no increased privacy concerns, neither.

9. **IANA Considerations**

   This draft specifies the following IPFIX IEs to export BGP community
   information along with other flow information.

   The Element IDs for these IEs are solicited to be assigned by IANA.
   The following table is for IANA's reference to put in each field in
   the registry.

```
   ----------------------------------------------------------------------
  |ElementID|          Name           | Data Type|Data Type Semantics|
  |----------------------------------------------------------------------|
```

ElementID	Name	Abstract Data Type	Data Type Semantics
TBA1	bgpCommunity	unsigned32	identifier
TBA2	bgpSourceCommunityList	basicList	list
TBA3	bgpDestinationCommunityList	basicList	list
TBA4	bgpExtendedCommunity	octetArray	default
TBA5	bgpSourceExtended CommunityList	basicList	list
TBA6	bgpDestinationExtended CommunityList	basicList	list
TBA7	bgpLargeCommunity	octetArray	default
TBA8	bgpSourceLargeCommunityList	basicList	list
TBA9	bgpDestinationLarge CommunityList	basicList	list

ElementID	Description	Units
TBA1	BGP community as defined in [RFC1997]	
TBA2	zero or more BGP communities corresponding with source IP address of a specific flow	
TBA3	zero or more BGP communities corresponding with destination IP address of a specific flow	
TBA4	BGP Extended Community as defined in [RFC4360] The size of this IE is 8 octets	
TBA5	zero or more BGP Extended Communities corresponding with source IP address of a specific flow	
TBA6	zero or more BGP Extended communities corresponding with destination IP address of a specific flow	
TBA7	BGP Large Community as defined in [RFC8092] The size of this IE is 12 octets.	
	zero or more BGP Large Communities	

```
|   TBA8   |      corresponding with source IP address   |         |
|          |                of a specific flow           |         |
|-------------------------------------------------------------------|
|          |       zero or more BGP Large communities    |         |
|   TBA9   |    corresponding with destination IP address|         |
|          |                of a specific flow           |         |
|-------------------------------------------------------------------|


 -------------------------------------------------------------------
|ElementID|  Range  |   References  | Requester | Revision |   date  |
|-------------------------------------------------------------------|
|   TBA1   |         |     RFC1997   |this draft |    0     |         |
|-------------------------------------------------------------------|
|   TBA2   |         |RFC6313,RFC1997|this draft |    0     |         |
|-------------------------------------------------------------------|
|   TBA3   |         |RFC6313,RFC1997|this draft |    0     |         |
|-------------------------------------------------------------------|
|   TBA4   |         |     RFC4360   |this draft |    0     |         |
|-------------------------------------------------------------------|
|   TBA5   |         |RFC6313,RFC4360|this draft |    0     |         |
|-------------------------------------------------------------------|
|   TBA6   |         |RFC6313,RFC4360|this draft |    0     |         |
|-------------------------------------------------------------------|
|   TBA7   |         |     RFC8092   |this draft |    0     |         |
|-------------------------------------------------------------------|
|   TBA8   |         |RFC6313,RFC8092|this draft |    0     |         |
|-------------------------------------------------------------------|
|   TBA9   |         |RFC6313,RFC8092|this draft |    0     |         |
|-------------------------------------------------------------------|
```

Figure 10: IANA Considerations

10. Acknowledgements

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their comments and suggestions to promote this document.
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Bagdonas, Stewart Bryant, Paolo Lucente, Job Snijders, Jared Mauch,
etc, for their discussion in the mail list.

11. References

11.1. Normative References

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Appendix A. Application Example

   In this section, we give an example to show the encoding format for
   the three new introduced IEs.

   Flow information including BGP communities is shown in the below
   table. Suppose we want all the fields to be reported by IPFIX.

```
--------------------------------------------------------------------------
|Source ip|Destination ip |Source BGP community|Destination BGP community|
--------------------------------------------------------------------------
| 1.1.1.1 |   2.2.2.2     |1:1001,1:1002,8:1001|    2:1002,8:1001        |
--------------------------------------------------------------------------
| 3.3.3.3 |   4.4.4.4     |3:1001,3:1002,8:1001|    4:1001,8:1001        |
--------------------------------------------------------------------------
```

               Figure 11: Flow information including BGP communities

A.1. Template Record

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|            SET ID = 2          |          Length = 24          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|       Template ID = 256       |         Field Count = 4       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|    SourceIPv4Address = 8     |        Field length = 4       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0| DestinationIPv4Address = 12 |        Field length = 4       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0| bgpSourceCommunityList = 459|      Field length = 0xFFFF    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0| bgpDestinationCommunityList |      Field length = 0xFFFF    |
| |          = 460              |                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

              Figure 12: Template Record Encoding Format

In this example, the Template ID is 256, which will be used in the
data record. The field length for bgpSourceCommunityList and
bgpDestinationCommunityList is 0xFFFF, which means the length of this
IE is variable, the actual length of this IE is indicated by the list
length field in the basic list format as per [RFC6313].

A.2. Data Set

The data set is represented as follows:

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|          SET ID = 256         |           Length = 92         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  SourceIPv4Address = 1.1.1.1                  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                DestinationIPv4Address = 2.2.2.2               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     255       |       List length = 17        |semantic=allof |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|      bgpCommunity = 458       |          Field Len = 4        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|        BGP Source Community Value 1 = 1:1001                  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|        BGP Source Community Value 2 = 1:1002                  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|        BGP Source Community Value 3 = 8:1001                  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

```
|     255       |         List length = 13      |semantic =allof|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|       bgpCommunity = 458      |          Field Len = 4        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         BGP Destination Community Value 1 = 2:1002            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         BGP Destination Community Value 2 = 8:1001            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                 SourceIPv4Address = 3.3.3.3                   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|               DestinationIPv4Address = 4.4.4.4               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     255       |         List length = 17      |semantic =allof|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|       bgpCommunity = 458      |          Field Len = 4        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         BGP Source Community Value 1  = 3:1001               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         BGP Source Community Value 2  = 3:1002               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         BGP Source Community Value 3  = 8:1001               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     255       |         List length = 13      |semantic =allof|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|       bgpCommunity = 458      |          Field Len = 4        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         BGP Destination Community Value 1 = 4:1001           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         BGP Destination Community Value 2 = 8:1001           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 13: Data Set Encoding Format

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