                        Registry and Extensions for
            P-Multicast Service Interface Tunnel Attribute Flags

Abstract

   The BGP-based control procedures for Multicast Virtual Private
   Networks (MVPNs) make use of a BGP attribute known as the
   "P-Multicast Service Interface (PMSI) Tunnel" attribute. The
   attribute contains a one-octet "Flags" field. The purpose of this
   document is to establish an IANA registry for the assignment of the
   bits in this field. Since the "Flags" field contains only eight
   bits, this document also defines a new BGP Extended Community,
   "Additional PMSI Tunnel Attribute Flags", that can be used to carry
   additional flags for the "P-Multicast Service Interface (PMSI)
   Tunnel" attribute. This document updates RFC 6514.

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/rfc7902.

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1. Introduction

   A BGP attribute, "P-Multicast Service Interface (PMSI) Tunnel"
   attribute is defined in [RFC6514]. This attribute, referred to as
   the "PMSI Tunnel" attribute in this document, contains a one-octet
   "Flags" field. Only one flag is defined in that RFC, but there is
   now a need to define additional flags. However, that RFC did not
   create an IANA registry for the assignment of bits in the "Flags"
   field. This document creates a registry for that purpose. In
   addition, there may be a need to define more than eight flags.
   Therefore this document defines a new BGP Extended Community,
   "Additional PMSI Tunnel Attribute Flags", that can be used to carry
   additional flags for the "PMSI Tunnel" attribute. A registry is also
   created for this Extended Community, allowing IANA to assign flag
   bits from the Extended Community's six-octet value field.

   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].

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2. Extending the "PMSI Tunnel" Attribute "Flags" Field

   In [RFC6514], only a single octet in the "PMSI Tunnel" attribute is
   defined to carry bit flags. This allows eight flags, which is
   unlikely to be sufficient for all future applications.

   This document defines a new Transitive Opaque Extended Community
   ([RFC4360] [RFC7153]), "Additional PMSI Tunnel Attribute Flags". It
   also defines a new bit flag in the "PMSI Tunnel" attribute "Flags"
   field, called the "Extension" flag.

   The "Additional PMSI Tunnel Attribute Flags" Extended Community MUST
   NOT be carried by a given BGP UPDATE message unless the following
   conditions both hold:

   o the given BGP UPDATE message is also carrying a "PMSI Tunnel"
      attribute, and

   o the "Extension" flag of that "PMSI Tunnel" attribute's "Flags"
      field is set.

   The six-octet value field of the "Additional PMSI Tunnel Attribute
   Flags" Extended Community is considered to be a string of 48 one-bit
   flags. As shown in Figure 1, the leftmost bit (the most significant
   bit of the most significant octet) is bit 0, and the rightmost bit
   (the least significant bit of the least significant octet) is bit 47.

```
    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
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |               |               |               |               |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

    3               4
    2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |               |               |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
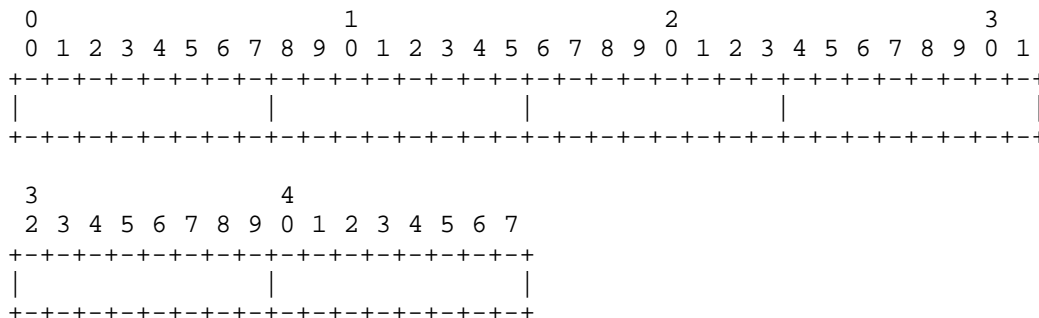
              Figure 1: Value Field of the "Additional PMSI
               Tunnel Attribute Flags" Extended Community

   A BGP speaker MUST NOT attach more than one "Additional PMSI Tunnel
   Attribute Flags" Extended Community to a given BGP UPDATE. If a
   given BGP UPDATE already contains an "Additional PMSI Tunnel
   Attribute Flags" Extended Community, a BGP speaker MUST NOT attach
   any additional such Extended Communities.

If a BGP speaker receives a BGP UPDATE with more than one "Additional
PMSI Tunnel Attribute Flags" Extended Communities attached, only the
flag settings in first occurrence of the Extended Community are
significant. Flag settings in subsequent occurrences of the Extended
Community MUST be ignored. When propagating the UPDATE, all
instances of the Extended Community other than the first SHOULD be
removed.

Suppose a BGP speaker receives an UPDATE message that contains a
"PMSI Tunnel" attribute, but does not contain an "Additional PMSI
Tunnel Attribute Flags" Extended Community. If the "Extension" flag
of the "PMSI Tunnel" attribute is set, the UPDATE is considered to be
malformed, and the "treat-as-withdraw" procedure of [RFC7606] MUST be
applied.

If a BGP speaker receives an UPDATE message that contains one or more
"Additional PMSI Tunnel Attribute Flags" Extended Communities, but
either (a) that UPDATE message does not contain a "PMSI Tunnel"
attribute, or (b) the "Extension" flag of the "PMSI Tunnel" attribute
is not set, then the Extended Community(ies) SHOULD be removed and
SHOULD NOT be redistributed. The BGP UPDATE message MUST be
processed (and if necessary, redistributed) as if the Extended
Community(ies) had not been present.

A BGP speaker that supports the current document, but does not
recognize a particular flag (either in the" PMSI Tunnel" attribute
"Flags" field or in the "Additional PMSI Tunnel Attribute Flags"
Extended Community) MUST simply ignore that flag. If the BGP speaker
propagates either the "PMSI Tunnel" attribute, the "Additional PMSI
Tunnel Attribute Flags" Extended Community, or both along with the
UPDATE message, it SHOULD leave the setting of the flag unchanged.

It is possible that a particular application will require all members
of a particular set of BGP speakers to support a particular flag.
How it is determined whether all such BGP speakers support that flag
is outside the scope of this document.

In some situations, a BGP speaker may need to modify or replace the
"PMSI Tunnel" attribute before propagating an UPDATE. If the
"Extension" flag of the "PMSI Tunnel" attribute was set before the
attribute is modified or replaced, but that flag is no longer set
after the attribute is modified or replaced, any "Additional PMSI
Tunnel Attribute Flags" Extended Communities MUST be removed before
the UPDATE is propagated. If the "PMSI Tunnel" attribute is removed
entirely before an UPDATE is propagated, the "Additional PMSI Tunnel
Attribute Flags" Extended Communities (if any) MUST also be removed.

3. IANA Considerations

   IANA has created a new registry called "P-Multicast Service Interface
   (PMSI) Tunnel Attribute Flags" in the "Border Gateway Protocol (BGP)
   Parameters" registry.

   Per Section 5 of [RFC6514], a "PMSI Tunnel" attribute contains a
   "Flags" octet. The "Flags" field is a single octet, with bits
   numbered, left-to-right, from 0 to 7. IANA has initialized the
   registry as follows:

```
     Bit Position      Description                    Reference
     (left to right)
          0             unassigned
          1             Extension                     This document
          2             unassigned
          3             unassigned
          4             unassigned
          5             unassigned
          6             unassigned
          7             Leaf Information Required (L)  RFC 6514

                "PMSI Tunnel" Attribute Flags
```

   The registration procedure for this registry is Standards Action.

   IANA has also assigned the codepoint 0x07 from the "First Come, First
   Served" range of the "Transitive Opaque Extended Community Sub-Types"
   registry for "Additional PMSI Tunnel Attribute Flags".

   IANA has established a registry for the bit flags carried in the
   "Additional PMSI Tunnel Attribute Flags" Extended Community. The
   bits are numbered 0-47, with 0 being the most significant bit and 47
   being the least significant bit. The registration policy for this
   registry is "Standards Action".

   The initial registry should be as follows:

```
               Bit Flag         Name          Reference

                0-47            Unassigned

             Additional "PMSI Tunnel" Attribute Flags
```

4. Security Considerations

   This document establishes an IANA registry, and defines a new
   Transitive Opaque Extended Community ([RFC4360], [RFC7153]).

   Establishment of an IANA registry does not raise any security
   considerations.

   While this document defines a new Extended Community for carrying bit
   flags, it does not define any of the bit flags in that Extended
   Community. Therefore, no security considerations are raised.

   This document defines a new flag, the "Extension" flag, in the "PMSI
   Tunnel" attribute. If a particular UPDATE contains a "PMSI Tunnel"
   attribute with this flag set, but the UPDATE does not contain an
   "Additional PMSI Tunnel Attribute Flags" Extended Community, then the
   UPDATE is considered to be malformed, and the "treat-as-withdraw"
   procedure of [RFC7606] is invoked. Thus, one can cause an UPDATE to
   be treated as a withdrawal by incorrectly setting this bit.

5. Normative References

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