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BMP Extension for Path Marking TLV
draft-cppy-grow-bmp-path-marking-tlv-01

Abstract

   The BGP Monitoring Protocol (BMP) provides an interface for obtaining
   BGP Path information. BGP Path Information is conveyed within BMP
   Route Monitoring (RM) messages. This document proposes an extension
   to BMP to convey the status of a BGP path after being processed by
   the BGP best-path selection algorithm. This extension makes use of
   the TLV mechanims described in draft-lucente-bmp-tlv
   [I-D.lucente-bmp-tlv].

Requirements Language

   The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
   "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and
   "OPTIONAL" in this document are to be interpreted as described in BCP
   14 RFC 2119 [RFC2119] RFC 8174 [RFC8174] when, and only when, they
   appear in all capitals, as shown here.

   This Internet-Draft will expire on May 3, 2020.

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1. **Introduction**

   For a given prefix, multiple paths with different path status, e.g.,
   the "best-path", "back-up path" and so on, may co-exist in the BGP
   RIB after being processed by the local policy and the BGP decision
   process. The path status information is currently not carried in the
   BGP Update Message RFC4271 [RFC4271] or in the BMP Update Message
   RFC7854 [RFC7854].

   External systems can use the path status for various applications.
   The path status is commonly checked by operators when performing
   troubleshooting. Having such status stored in a centralized system
   can enable the development of tools facilitating this process.
   Optimisation systems can include the path status in their process,
   and also use the status as a validation source (since it can compare
   the calculated state to the actual outcome of the network, such as
   primary and backup path). As a final example, path status

information can complement other centralized sources of data, for
example, flow collectors.

This document defines a so-called Path Marking TLV to convey the BGP
path status information to the BMP server. The BMP Path Marking is
defined to be prepended in the BMP Route Monitoring (RM) Message.

2. Path Marking TLV for the RM Message

As per RFC4271 [RFC4271], the BMP RM Message consists of the Common
Header, Per-Peer Header, and the BGP Update PDU. According to draft-
lucente-bmp-tlv [I-D.lucente-bmp-tlv] , optional trailing data in TLV
format is allowed in the BMP RM Message to convey characteristics of
transported NLRIs (i.e. to help stateless parsing) or vendor-specific
data. Such TLV types are to be defined for each application.

To include the path status along with each BGP path, we define the
Path Marking TLV, shown as follows.

```
  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
 +------------------------------+------------------------------+
 |        Type (2 octets)       |       Length (2 octets)      |
 +------------------------------+------------------------------+
 |                       Path Type(4 octets)                   |
 +-------------------------------------------------------------+
 |                    Reason String(Variable)                  |
 +-------------------------------------------------------------+
```

Figure 1: Path Marking TLV

o Type = TBD1 (2 Octets): Path Marking.

o Length (2 Octets): indicates the length of the value field of the
   Path Marking TLV. The value field further consists of the Path-
   Status field and Reason String field.

o Path-Status (4 Octets): indicates the path status of the BGP
   Update PDU encapsulated in the RM Message. Currently 8 types of
   path status are defined, as shown in Table 1.

o Reason String (Variable): indicates the reasons/explanations of
   the path status indicated in the Path Type field. The detailed
   Reason String format is defined in Figure 2.

2.1. Path Type

```
+--------+----------------------+
| Value  | Path type            |
+------------------------------+
| 0x0000 | Unknown              |
| 0x0001 | Best path            |
| 0x0002 | Best external path   |
| 0x0004 | Primary path         |
| 0x0008 | Backup path          |
| 0x0010 | Non-installed path   |
| 0x0020 | Unreachable next-hop |
+--------+----------------------+
```

Table 1: Path Type

The Path type field contains a bitfield where each bit encodes a specific role of the path. Multiple bits may be set when a path is used in multiple roles.

The best-path is defined in RFC4271 [RFC4271] and the best-external path is defined in draft-ietf-idr-best-external [I-D.ietf-idr-best-external].

A primary path is a recursive or non-recursive path that can be used all the time as long as a walk starting from this path can end to an adjacency draft-ietf-rtgwg-bgp-pic [I-D.ietf-rtgwg-bgp-pic]. A prefix can have more than one primary path if multipath is configured draft-lapukhov-bgp-ecmp-considerations [I-D.lapukhov-bgp-ecmp-considerations]. A best-path is also considered as a primary path.

A backup path is also installed in the RIB, but it is not used until some or all primary paths become unreachable. Backup paths are used for fast convergence in the event of failures.

All other reachable paths are marked as 'Non-installed'.

Lastly, all paths that are considered unreachable are marked as 'Unreachable next-hop'. Unreachable paths may be sent only in some specific cases.

2.2. Reason String

```
      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
     +-----------------------------+-----------------------------+
     |      Sub Type 1 (2 octets)  |      Length (2 octets)      |
     +-----------------------------+-----------------------------+
     |                Non-Best Reason String(Variable)           |
     +-----------------------------+-----------------------------+
     |      Sub Type 2 (2 octets)  |      Length (2 octets)      |
     +-----------------------------+-----------------------------+
     |               Uninstalled Reason String(Variable)         |
     +-----------------------------+-----------------------------+
     |      Sub Type 3 (2 octets)  |      Length (2 octets)      |
     +-----------------------------+-----------------------------+
     |               Unreachable Reason String(Variable)         |
     +-----------------------------------------------------------+
```
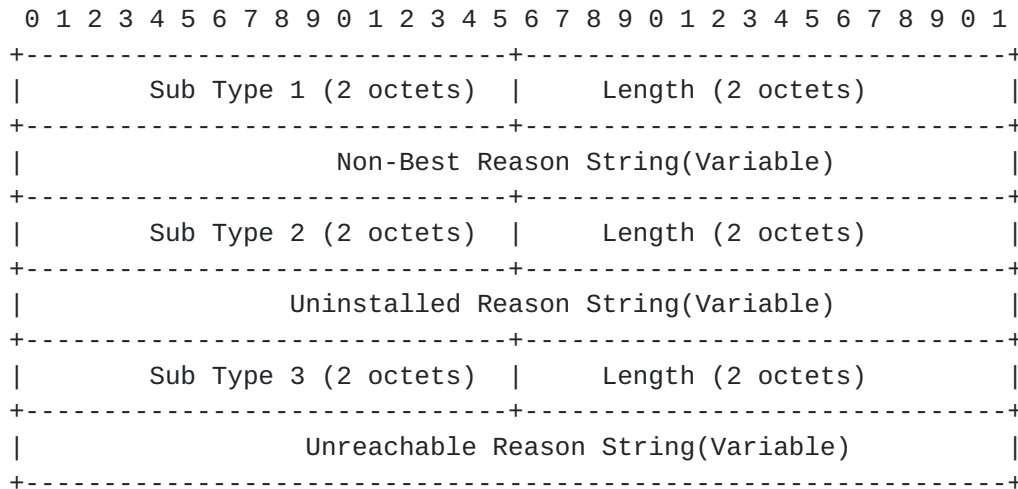
Figure 2: Reason String field

The reason string fields include multiple TLVs containing freeform
ASCII encoded messsages containing the reason of a specific path
status.

o Sub Type 1 (2 Octets) = TBD2: Non-Best Reason String.

o Length (2 Octets): indicates the length of the value field of the
   Non-Best Reason String.

o Non-Best Reason String (Variable): includes the reason why the
   path has a non-best status.

o Sub Type 2 (2 Octets) = TBD3: Uninstalled Reason String.

o Length (2 Octets): indicates the length of the value field of the
   Uninstalled Reason String.

o Uninstalled Reason String (Variable): includes the reason why the
   path has an uninstalled status.

o Sub Type 3 (2 Octets) = TBD4: Unreachable Reason String.

o Length (2 Octets): indicates the length of the value field of the
   Unreachable Reason String.

o Unreachable Reason String (Variable): includes the reason why the
   path has an unreachable status.

3. Acknowledgements

TBD.

4. IANA Considerations

This document requests that IANA assign the following new parameters
to the BMP parameters name space.

4.1. Path Marking TLV

This document defines the Path Marking TLV with Type = TBD1: Path
Marking (Section 2).

4.2. Path Marking TLV Reason String

This document defines three new sub types of the Reason String in the
Path Marking TLV (Section 2.2).

Sub Type 1 = TBD2: Non-Best Reason String.

Sub Type 2 = TBD3: Uninstalled Reason String.

Sub Type 3 = TBD4: Unreachable Reason String.

5. Security Considerations

It is not believed that this document adds any additional security
considerations.

6. Normative References

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