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BMP Extension for Path Marking TLV
draft-cppy-grow-bmp-path-marking-tlv-03

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-ietf-grow-bmp-tlv [I-D.ietf-grow-bmp-tlv] and draft-lucente-grow-bmp-tlv-ebit [I-D.lucente-grow-bmp-tlv-ebit].

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.

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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. Prefix Information TLV for the RM Message

As per RFC7854 [RFC7854], the BMP RM Message consists of the Common Header, Per-Peer Header, and the BGP Update PDU. According to draft-grow-bmp-tlv [I-D.ietf-grow-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.

This document defines the Prefix Information TLV to convey descriptional information for route prefixes. The format is shown below.

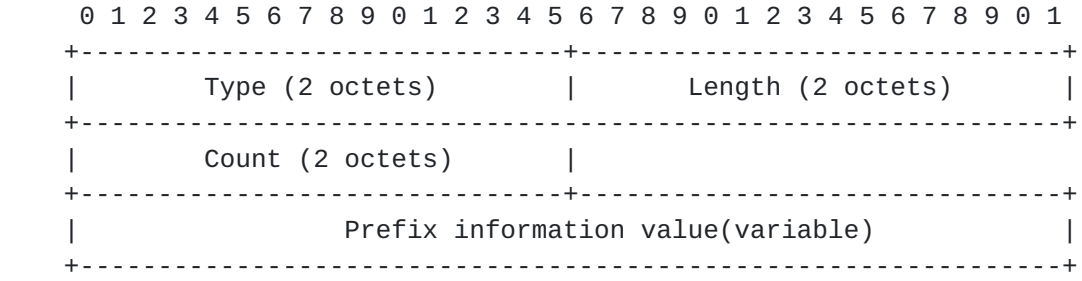

Figure 1: Prefix Information TLV

- Type = TBD1 (2 Octets): Prefix Information TLV.
- Length (2 Octets): indicates the length of the value field of the Prefix Information TLV.
- Count (2 Octets): indicates the number of sub TLVs followed in the Prefix Information Value field.
- Prefix information value (Variable): indicates the value of the Prefix Informtion TLV, which consists of one or multiple sub TLVs.

3. Path Marking sub-TLV

As stated in Appendix F.1 of RFC4271 [RFC4271], multiple address prefixes with the same path attributes are allowed to be specified in one message. However, such multiple prefixes may have different prefix information, e.g., path status. Thus, to indicate the path

status for each BGP prefix, we define the Path Marking sub-TLV. The order of the Path Marking sub-TLVs MUST be in accordance with the prefix order of the Update PDU.

The E-bit [I-D.lucente-grow-bmp-tlv-ebit] mechanism allows the usage of vendor-specific TLVs in addition to IANA-registered one. In this document, both encoding options for the Path Marking sub-TLV are described.

3.1. IANA-registered Path Markinig sub-TLV

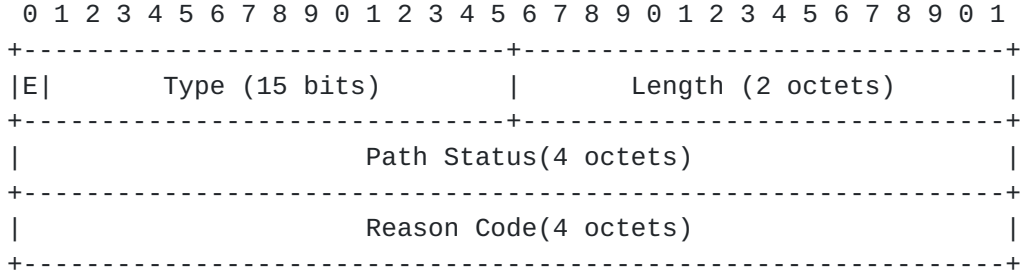

Figure 2:IANA-Registered Encoding of Path Marking sub-TLV

- E bit: For an IANA-registered sub-TLV, the E bit MUST be set to 0.
- Type = TBD2 (15 Bits): Path Marking sub-TLV.
- 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 Code field.
- Path Status (4 Octets): indicates the path status of the BGP Update PDU encapsulated in the RM Message. Currently 9 types of path status are defined, as shown in Table 1.
- Reason Code (4 Octets): indicates the reasons/explanations of the path status indicated in the Path Type field. The detailed Reason Code bitmap remains to be defined.

Value	Path type
0x00000000	Unknown
0x00000001	Invalid
0x00000002	Best
0x00000004	Non-selected
0x00000008	Primary
0x00000010	Backup
0x00000020	Non+installed
0x00000040	Best external
0x00000080	Add-Path

Table 1: IANA-Registered Path Type

The Path Status field contains a bitmap where each bit encodes a specific role of the path. Multiple bits may be set when multiple path status apply to a path.

- 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].

- An invalid path is a route that does not enter the BGP decision process.

- A non-selected path is a route that is not selected in the BGP decision process. Back-up routes are considered non-selected, while the best and ECMP routes are not considered as non-selected.

- A primary path is a recursive or non-recursive path whose nexthop resolution ends with 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.

- A non-installed path refers to the route that is not installed into the IP routing table.

- For the advertisement of multiple paths for the same address prefix without the new paths implicitly replacing any previous ones, the add-path status is applied RFC7911 [RFC7911].

3.2. Enterprise-specific Path Marking sub-TLV

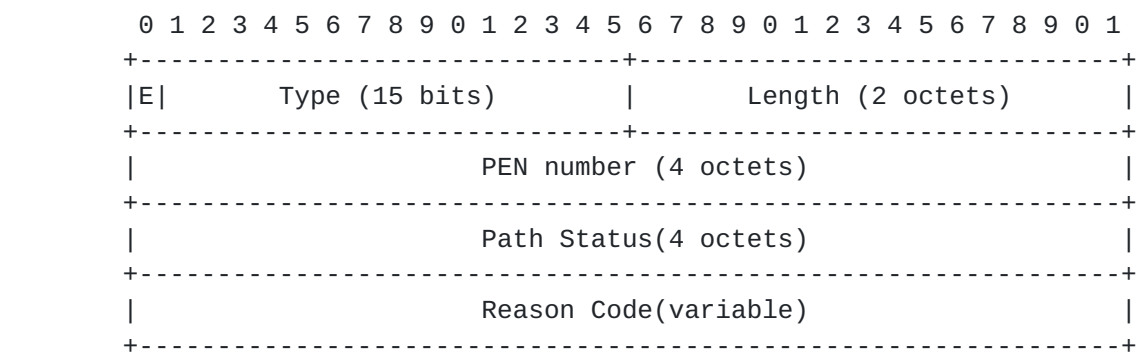

Figure 3: Enterprise-specific encoding of Path Markiing sub-TLV

- o E bit: For an Enterprise-specific sub-TLV, the E bit MUST be set to 1.

- o Type = 1 (15 Bits): indicates that it's the Enterprise-specific Path Marking sub-TLV.

- 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 Code field.

- o PEN Number (4 octets): indicates the IANA enterprise number IANA-PEN.

- o Path Status (4 Octets): indicates enterprise-specific path status, which remains to be defined.

- o Reason Code (Variable): indicates the reasons/explanations of the path status indicated in the Path Type field. The detailed Reason Code string is to be defined.

4. Acknowledgements

We would like to thank Jeff Haas for his valuable comments.

5. IANA Considerations

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

Type = TBD1 (2 Octets): Prefix Information TLV.

Type = TBD2 (15 Bits): Path Marking sub-TLV.

6. Security Considerations

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

7. Normative References

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