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## **TLV support for BMP Route Monitoring and Peer Down Messages**

### **Abstract**

Most of the message types defined by the BGP Monitoring Protocol (BMP) make provision for optional trailing data. However, Route Monitoring messages (which provide a snapshot of the monitored Routing Information Base) and Peer Down messages (which indicate that a peering session was terminated) do not. Supporting optional data in TLV format across all BMP message types allows for a homogeneous and extensible surface that would be useful for the most different use-cases that need to convey additional data to a BMP station. While it is not intended for this document to cover any specific utilization scenario, it defines a simple way to support optional TLV data in all message types.

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## 1. Introduction

The BGP Monitoring Protocol (BMP) is defined in The Route Monitoring message consists of: The Peer Down Notification message consists of: [RFC 7854](#) [[RFC7854](#)].

\*Common Header

\*Per-Peer Header

\*BGP Update PDU

\*Common Header

\*Per-Peer Header

\*Reason

\*Data (only if Reason code is 1, 2 or 3)

This means that both Route Monitoring and Peer Down messages have a non-extensible format. In the Route Monitoring case, this prevents the transmission of characteristics of transported NLRIs (e.g. to help with stateless parsing) or of vendor-specific data. In the Peer Down case, this prevents matching with TLVs previously sent

with the Peer Up message. The proposal of this document is to bump the BMP version, for backward compatibility, and allow all message types to make provision for trailing TLV data.

## 2. Terminology

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.

## 3. TLV encoding

The TLV data type is already defined in [Section 4.4 of](#) [[RFC7854](#)] for the Initiation and Peer Up message types. A TLV consists of:

\*2 octets of TLV Type,

\*2 octets of TLV Length,

\*0 or more octets of TLV Value.

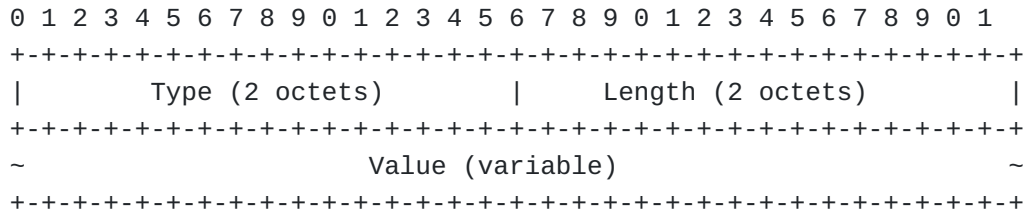


Figure 1

TLVs SHOULD be sorted by their code point. Multiple TLVs of the same type can be repeated as part of the same message, and it is left to the specific use-cases whether all, any, the first or the last TLV should be considered.

Route Monitoring messages may require per-NLRI TLVs, that is, there may be a need to map TLVs to NLRIs contained in the BGP Update message, for example, to express additional characteristics of a specific NLRI. For this purpose specifically, TLVs in Route Monitoring messages MUST be indexed, with the index starting at one (1) to refer to the first NLRI. Index zero (0) specifies that a TLV does apply to all NLRIs contained in the BGP Update message. Indexed TLVs are encoded as in the following figure:

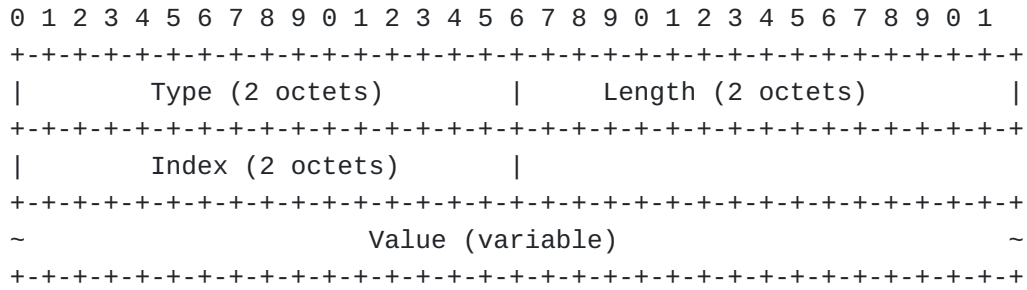


Figure 2

Of the BMP message types defined so far, indexed TLVs apply only to Route Monitoring messages and, for example, they do not apply to Route Mirroring messages because the sender may not be aware of the payload of the transported BGP Update message.

## 4. BMP Message Format

### 4.1. Common Header

[Section 4.1 of \[RFC7854\]](#) defines the Common Header. While the structure remains unaltered, the following two definitions are changed:

\*Version: Indicates the BMP version. This is set to '4' for all messages.

\*Message Length: Total length of the message in bytes (including headers, encapsulated BGP message and optional data)

### 4.2. TLV data in Route Monitoring

The Route Monitoring message type is defined in [Section 4.6 of \[RFC7854\]](#). The BGP Update PDU [Section 4.3 of \[RFC4271\]](#) MAY be followed by TLV data. This document defines the following new code points to help stateless parsing of BGP Update PDUs:

\*Type = TBD1: the BGP Update PDU is encoded with support for the 4-octet AS number capability [RFC 6793 \[RFC6793\]](#), length MUST be 1 and value MUST be 0 for false and 1 for true.

\*Type = TBD2: the BGP Update PDU is encoded with the ADD-PATH capability [RFC 7911 \[RFC7911\]](#), length MUST be 1 and value MUST be 0 for false and 1 for true.

\*Type = TBD3: the BGP Update PDU is encoded with the Multiple Labels capability [RFC 8277 \[RFC8277\]](#), length MUST be 1 and value MUST be 0 for false and 1 for true.

### **4.3. TLV data in Peer Down**

The Peer Down Notification message type is defined in [Section 4.9 of \[RFC7854\]](#). For Reason codes 1 or 3, a BGP Notification PDU follows; the PDU MAY be followed by TLV data. For Reason code 2, a 2-byte field to give additional FSM info follows; this field MAY be followed by TLV data. For all other Reason codes, TLV data MAY follow the Reason field.

### **4.4. TLV data in other BMP messages**

All other message types defined in [RFC7854 \[RFC7854\]](#) already provide for TLV data. It is RECOMMENDED that all future BMP message types also provide for trailing TLV data.

## **5. Error handling**

When a BGP PDU is enclosed in BMP messages (always for Route Monitoring messages, in some cases for Peer Down messages), processing of optional trailing data is subject to proper decoding of a well-formed BGP message.

Additionally, it is worth noting that [RFC8654 \[RFC8654\]](#) permits BGP Updates and other messages to grow to a length of 65535 octets. This may cause a BMP PDU that attempts to encapsulate such long messages to overflow.

## **6. Security Considerations**

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

## **7. Operational Considerations**

In Route Monitoring messages, the number of TLVs can be bound to the amount of NLRIs carried in the BGP Update message. This may degrade the packing of information in such messages and have specific impacts on the memory and CPU used in a BMP implementation. As a result of that it should always be possible to disable such features to mitigate their impact.

## **8. IANA Considerations**

This document requests the definition of two new registries "BMP Route Monitoring Information TLVs" and "BMP Peer Down Information

TLVs". As part of the "BMP Route Monitoring Information TLVs" registry, the following new TLV types are defined ([Section 4.2](#)):

\*Type = TBD1: Support for the 4-octet AS number capability. The value field is set to 1 if the BGP Update PDU enclosed in the Route Monitoring message was encoded according to the capability.

\*Type = TBD2: ADD-PATH capability. The value field is set to 1 if the BGP Update PDU enclosed in the Route Monitoring message was encoded according to the capability.

\*Type = TBD3: Multiple Labels capability. The value field is set to 1 if the BGP Update PDU enclosed in the Route Monitoring message was encoded according to the capability.

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