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BMP Route Change Statistics Based on Routing Policy
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Abstract

This document defines few generic BGP Monitoring Protocol (BMP) statistics for monitoring route modifications or changes due to applying Routing Policy. These statistics are reported per BGP peer using the BMP Statistics Report message.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on 14 July 2026.

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1. Introduction

[RFC7854] and [RFC8671] defines different BMP statistics, and [I-D.ietf-grow-bmp-bgp-rib-stats] extends these BMP statistics to provide more insights into the BGP RIBs.

Routing Policy are widely used in BGP to modify route attributes. Monitoring which route attributes are modified and how often can provide valuable insights for network operators.

This document defines few BMP statistics to report such route modifications in a generic and address-family-independent manner. The format of the BMP statistics message remains same as defined in [RFC7854]. Besides address family and gauge in the Stat Data (value) [RFC7854], these statistics also provide attribute types of route changes. This route attribute could be the BGP path attributes [RFC4271] or additional route attributes for Qos and forwarding-related parameters.

1.1. 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 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here. The BCP14 is used to stress importance for operators but are not required as formal implementation requirement.

2. Motivation and Use Cases

The ability to track route modifications via Routing Policy enables operators to understand policy impact, detect misconfigurations, and analyze routing behavior. The attribute type and gauge allow external collectors to derive distribution insights.

3. Per-Peer Reporting

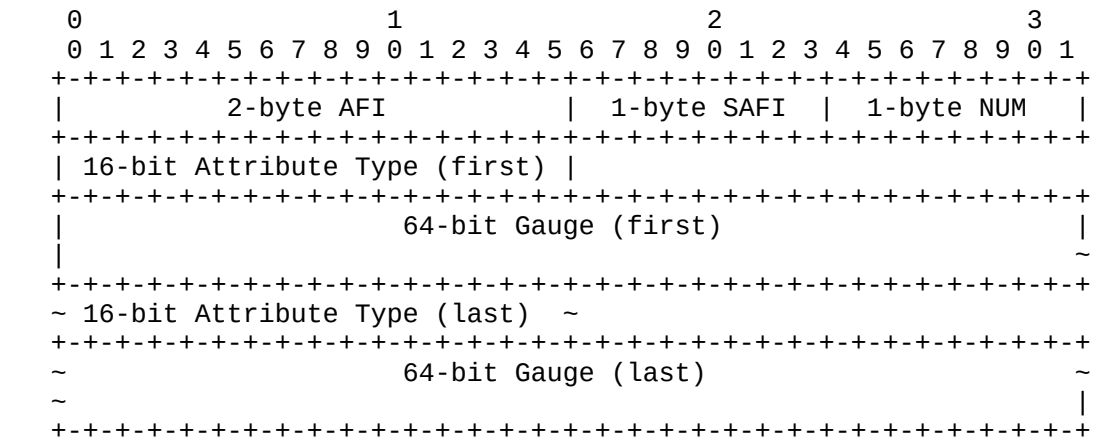
The BMP peer statistics report message is reported per BGP peer. Therefore, each route attribute modification count is associated with a specific peer, enabling peer-level policy analysis.

For locally originated routes applying routing policy, the peer is regarded as the local router itself, per Section 8.2 of [RFC7854].

4. Route Change Statistics based on Routing Policy

4.1. Statistics Format

These statistics defined in this document indicate which route attribute were modified by routing policy using a 16-bit attribute type value followed by a 64-bit Gauge. and These statistics are applicable to all BGP address families, represented by Address Family Identifier (AFI) and Subsequent Address Family Identifier (SAFI) [RFC4760]. Therefore, the value (Stat Data) of these statistics is structured as: 2-byte AFI, 1-byte SAFI, 16-bit Attribute Type, followed by a 64-bit Gauge, as shown in the figure below.



* AFI: The AFI value is defined in IANA Address Family Numbers (https://www.iana.org/assignments/address-family-numbers.xhtml).

* SAFI: The SAFI value is defined in IANA SAFI Values (https://www.iana.org/assignments/safi-namespace.xhtml).

* NUM: Indicates that the number of attribute types included in the same message.

* Attribute Type: Indicates which route attribute was modified by applying routing policy. The attribute type supports up to 2^16 types. In addition to the types defined in this document, new attribute types of route change may be defined in the future. The attribute type defined in this document is as follows:

* - Attribute Type = 0x0001: Local Preference.

  - Attribute Type = 0x0002: AS Path.

  - Attribute Type = 0x0003: MED.

  - Attribute Type = 0x0004: Community.

  - Attribute Type = 0x0005: Extended Community.

  - Attribute Type = 0x0006: Large Community.

  - Attribute Type = 0x0007: Origin.

  - Attribute Type = 0x0008: Next Hop.

  - Attribute Type = 0x0009: ESI.

- Attribute Type = 0x000A: AIGP.
- Attribute Type = 0x000B: Prefix SID.
- Attribute Type = 0x000C: DSCP.
- Attribute Type = 0x000D: VPN Peer ID.
- Attribute Type = 0x000E: Preferred Value.
- Attribute Type = 0x000F: IP Precedence.
- Attribute Type = 0x0010: QoS Local ID.
- Attribute Type = 0x0011: Traffic Index.
- Attribute Type = 0x0012: MPLS EXP.
- Attribute Type = 0x0013-0xFFFF: Reserved, Vendor-specific route attribute range.

These statistics only apply to the AFI/SAFIs that a BGP speaker supports and negotiates with its peer. These statistics for the Attribute Type that hasn’t been modified by routing policy, MUST NOT be reported via the BMP Statistics Report Message. For these statistics defined in this document, the routes that are rejected by inbound or outbound policy are not considered.

4.2. Statistics Definition

* Stat Type = TBD_01: (64-bit Gauge) Number of routes with specific change attribute in per-AFI/SAFI post-policy Adj-RIB-In due to the application of inbound policy.
* Stat Type = TBD_02: (64-bit Gauge) Number of routes with specific change attribute in per-AFI/SAFI post-policy Adj-RIB-Out due to the application of outbound policy.

5. Security Considerations

Procedures and protocol extensions defined in this document do not affect the BMP security model. All security and authentication mechanisms required by Section 11 of [RFC7854], and Section 8 of [RFC8671] are also applicable to the gauges defined in this document. This document does not add any additional security considerations.

6. IANA Considerations

IANA has assigned the following new parameters in the BMP Statistics Types registry (https://www.iana.org/assignments/bmp-parameters/bmp-parameters.xhtml#statistics-types), part of the BMP parameters registry group (https://www.iana.org/assignments/bmp-parameters/bmp-parameters.xhtml).

This document requests IANA to update these entries as follows. Also, the document requests IANA to update the reference cited for the entries.

* Type = TBD_01: Number of routes with specific change attribute in per-AFI/SAFI post-policy Adj-RIB-In due to the application of inbound policy.

* Type = TBD_02: Number of routes with specific change attribute in per-AFI/SAFI post-policy Adj-RIB-Out due to the application of outbound policy.

7. References

7.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <https://www.rfc-editor.org/info/rfc2119>.

[RFC4271] Rekhter, Y., Ed., Li, T., Ed., and S. Hares, Ed., "A Border Gateway Protocol 4 (BGP-4)", RFC 4271, DOI 10.17487/RFC4271, January 2006, <https://www.rfc-editor.org/info/rfc4271>.

[RFC4760] Bates, T., Chandra, R., Katz, D., and Y. Rekhter, "Multiprotocol Extensions for BGP-4", RFC 4760, DOI 10.17487/RFC4760, January 2007, <https://www.rfc-editor.org/info/rfc4760>.

[RFC7854] Scudder, J., Ed., Fernando, R., and S. Stuart, "BGP Monitoring Protocol (BMP)", RFC 7854, DOI 10.17487/RFC7854, June 2016, <https://www.rfc-editor.org/info/rfc7854>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <https://www.rfc-editor.org/info/rfc8174>.

[RFC8671] Evens, T., Bayraktar, S., Lucente, P., Mi, P., and S. Zhuang, "Support for Adj-RIB-Out in the BGP Monitoring Protocol (BMP)", RFC 8671, DOI 10.17487/RFC8671, November 2019, <https://www.rfc-editor.org/info/rfc8671>.

[I-D.ietf-grow-bmp-bgp-rib-stats] Srivastava, M., Liu, Y., Lin, C., and J. Li, "Advanced BGP Monitoring Protocol (BMP) Statistics Types", Work in Progress draft-ietf-grow-bmp-bgp-rib-stats-17, December 2025, <https://datatracker.ietf.org/doc/html/draft-ietf-grow-bmp-bgp-rib-stats-17>.

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