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S. Dikshit
Aruba Networks, HPE
M. Srivastava
Hewlett Packard Enterprise
C. Lin
New H3C Technologies

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EVPN-Specific BMP RIB Statistics Extensions
draft-saum-grow-bmp-afi-safi-evpn-04

Abstract

This document defines new EVPN-specific BGP Monitoring Protocol (BMP) statistics types. These extensions include scalar counters for EVPN route types specifically, while also keeping scope for defining counters which are EVPN route-type agnostic but related to BGP-EVPN RIB like, number of multihoming Ethernet Segments, number of multihomed EVIs, number of aliased paths, number of dynamic inter-VRF route leaking (IVRL).

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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1. Introduction

[RFC7854] defines different BMP statistics message types and [I-D.ietf-grow-bmp-bgp-rib-stats] extends the BMP statistics to provide more insights into the BGP RIBs. This document extends the BMP RIB statistics by adding EVPN-specific statistics types to monitor EVPN-related events in Adj-RIB-In, Adj-RIB-Out, and Local-RIB for the EVPN address family (AFI=25, SAFI=70) as defined in [RFC7432] and extended by [RFC9135] for integrated routing and bridging, forms the basis for these statistics.

The format of the BMP statistics message remains same as defined in [RFC7854].

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.

2. EVPN-Specific BMP Statistics Extensions

This section defines EVPN-specific statistics types for BMP, applicable to the EVPN address family (AFI=25, SAFI=70). These statistics type for all 5 RIB views: Adj-RIB-In-Pre, Adj-RIB-In-Post, Local-RIB, Adj-RIB-Out-Pre and Adj-RIB-Out-Pre. and to define more specific counters other than the route-types in future.

2.1. Global EVPN Route Statistics

The section defines global EVPN route or other information statistics, e.g., the overall Ethernet Auto-discovery Route counters.

2.1.1. Statistics Definitions

This section defines different statistics type for global EVPN monitoring type.

* Type=TBD_01: Statistics for global EVPN routes received in Adj-RIB-In before inbound policy is applied.

* Type=TBD_02: Statistics for global EVPN routes in Adj-RIB-In after inbound policy is applied.

* Type=TBD_03: Statistics for global EVPN routes in the local RIB.

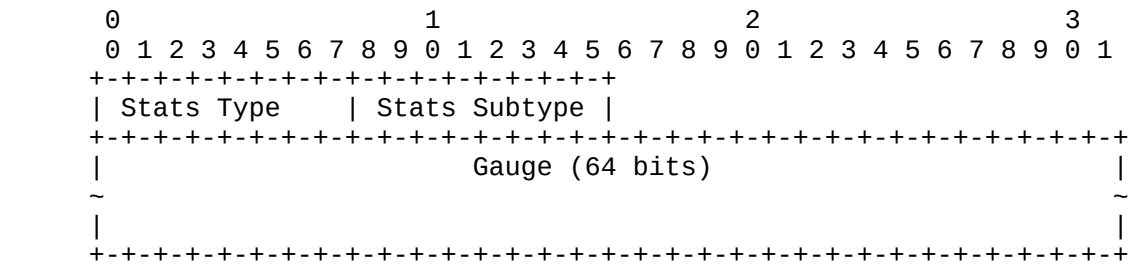
* Type=TBD_04: Statistics for global EVPN routes in Adj-RIB-Out before outbound policy is applied.

* Type=TBD_05: Statistics for global EVPN routes in Adj-RIB-Out after outbound policy is applied.

* Type=TBD_06: Statistics for global EVPN information of ESs/EVIs/ aliased paths.

2.1.2. Statistics Format

The statistics values are encoded as 1-octet Stats types, 1-octet Stats Subtype followed by 64-bit gauges. The statistics values are encoded in Stat Data as defined in 4.8 of [RFC7854]. Each counter is encoded as follows:



* Stats Type (1 octet): EVPN stats type. Defined types are:

  - Type = 0: EVPN route statistics in the RIB.

  - Type = 1: EVPN leaked route statistics in the local RIB.

  - Type = 2: EVPN multihoming Ethernet Segments (ESs) statistics.

  - Type = 3: EVPN multihomed EVPN instances (EVIs) statistics.

  - Type = 4: EVPN aliased paths statistics.

* Stats Subtype (1 octet): Indicates the EVPN route type associated with this statistic, as defined in

  - Subtype = 0: Reserved.

  - Subtype = 1: EVPN route type 1 (Ethernet Auto-discovery).

  - Subtype = 2: EVPN route type 2 (MAC/IP Advertisement).

  - Subtype = 3: EVPN route type 3 (Inclusive Multicast Ethernet Tag Route).

  - Subtype = 4: EVPN route type 4 (Ethernet Segment Route).

  - Subtype = 5: EVPN route type 5 (IP Prefix Route).

  - Subtype = 6: EVPN route type 6 (Selective Multicast Ethernet Tag Route).

  - Subtype = 7: EVPN route type 7 (IGMP Join Synchronization Route).

  - Subtype = 8: EVPN route type 8 (IGMP Leave Synchronization Route).

  - Subtype = 9: EVPN route type 9 (Per-Region I-PMSI A-D route).

- Subtype = 10: EVPN route type 10 (S-PMSI A-D route).

- Subtype = 11: EVPN route type 11 (Leaf A-D route).

Stats Subtype is only used when Stats Type is set to 0 and 1; otherwise, Stats Subtype is omitted. A BMP implementation MUST ignore unrecognized stat types on receipt, and likewise MUST ignore unexpected data in the Stat Data field.

2.2. Per-EVI EVPN Route Statistics

The section defines specific EVI EVPN route statistics, e.g., per-EVI IP Prefix Route counters.

2.2.1. Statistics Definitions

This section defines different statistics type for per-EVI EVPN monitoring type.

* Type=TBD_07: Statistics for per-EVI EVPN routes received in Adj-RIB-In before inbound policy is applied.

* Type=TBD_08: Statistics for per-EVI EVPN routes in Adj-RIB-In after inbound policy is applied.

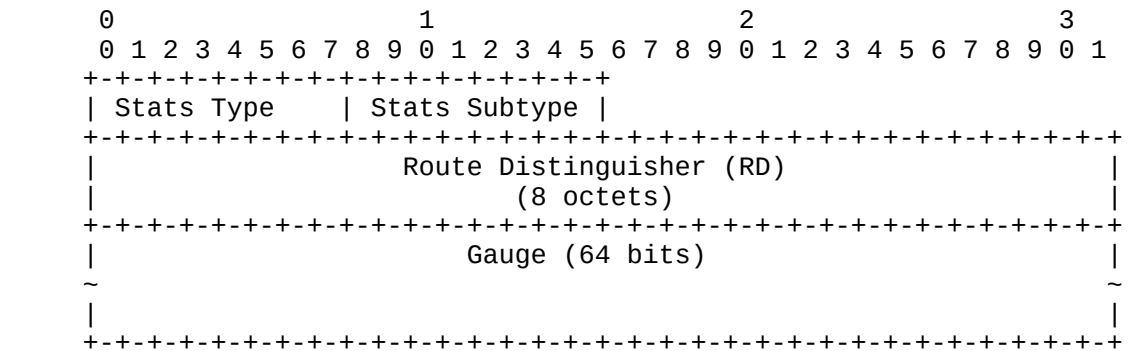
* Type=TBD_09: Statistics for per-EVI EVPN routes in the local RIB.

* Type=TBD_10: Statistics for per-EVI EVPN routes in Adj-RIB-Out before outbound policy is applied.

* Type=TBD_11: Statistics for per-EVI EVPN routes in Adj-RIB-Out after outbound policy is applied.

2.2.2. Statistics Format

The statistics values are encoded as 1-octet Stats types, 1-octet Stats Subtype, and 8-octet Route Distinguisher (RD) followed by 64-bit gauges. The statistics values are encoded in Stat Data as defined in 4.8 of [RFC7854]. Each counter is encoded as follows:



* Stats Type (1 octet): EVPN stats type, as defined in Section 2.1.2.

* Stats Subtype (1 octet): Indicates the EVPN route type associated with this statistic, as defined in Section 2.1.2.

* Route Distinguisher (RD) (8 octets): Indicates source EVI associated with the EVPN route. The Route Distinguisher (RD) field MUST be populated with the corresponding source EVI's RD of the EVPN route.

3. YANG Model Alignment

The counters defined in this document align with the EVPN YANG model described in [I-D.ietf-bess-evpn-yang-07]. Route type counters map to YANG leaves for EVPN route statistics, multihoming and IVRL counters align with Ethernet Segment and VRF-related leaves, the route-map bitmap aligns with policy-related leaves, and segment failure impact aligns with failure event counters. The referenced EVPN YANG model is expired but used due to its relevance to EVPN statistics alignment. Implementations SHOULD check for newer versions. Implementations SHOULD ensure compatibility with the YANG model for integrated monitoring.

4. IANA Considerations

This document requests that IANA assign new BMP statistics types from the "BMP Statistics Type" registry for the following:

* Type TBD_01: rib-in-pre-evpn-route-stats: Statistics for global EVPN routes received before inbound policy is applied.

* Type TBD_02: rib-in-post-evpn-route-stats: Statistics for global EVPN routes after inbound policy is applied.

* Type TBD_03: loc-rib-evpn-route-stats: Statistics for global EVPN routes in the local RIB.

* Type TBD_04: rib-out-pre-evpn-route-stats: Statistics for global EVPN routes before outbound policy is applied.

* Type TBD_05: rib-out-post-evpn-route-stats: Statistics for global EVPN routes after outbound policy is applied.

* Type TBD_06: rib-out-post-evpn-info-stats: Statistics for global EVPN information of ESs/EVIs/aliased paths.

* Type TBD_07: rib-in-pre-evpn-route-per-evi-stats: Statistics for per-EVI EVPN routes received before inbound policy is applied.

* Type TBD_08: rib-in-post-evpn-route-per-evi-stats: Statistics for per-EVI EVPN routes after inbound policy is applied.

* Type TBD_09: loc-rib-evpn-route-per-evi-stats: Statistics for per-EVI EVPN routes in the local RIB.

* Type TBD_10: rib-out-pre-evpn-route-per-evi-stats: Statistics for per-EVI EVPN routes before outbound policy is applied.

* Type TBD_11: rib-out-post-evpn-route-per-evi-stats: Statistics for per-EVI EVPN routes after outbound policy is applied.

The 11 types are sufficient to provide generic monitoring of EVPN route types across Adj-RIB-In, Adj-RIB-Out, and Local-RIB.

5. Security Considerations

The security considerations of [RFC7854] apply to this document. No additional security risks are introduced by these EVPN-specific statistics, including the route-map attributes bitmap.

6. References

6.1. Normative References

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

[RFC7432] Sajassi, A., Aggarwal, R., Bitar, N., Isaac, A., Uttaro, J., Drake, J., and W. Henderickx, "BGP MPLS-Based Ethernet VPN", RFC 7432, DOI 10.17487/RFC7432, February 2015, <https://www.rfc-editor.org/info/rfc7432>.

[RFC9135] Sajassi, A., Drake, J., Boutros, S., and J. Rabadan, "Integrated Routing and Bridging in Ethernet VPN (EVPN)", RFC 9135, DOI 10.17487/RFC9135, October 2021, <https://www.rfc-editor.org/info/rfc9135>.

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[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>.

6.2. Informative References

[I-D.ietf-bess-evpn-yang-07] Brissette, P., Shah, H., Chen, I., and K. Patel, "Yang Data Model for EVPN", Work in Progress draft-ietf-bess-evpn-yang-07, March 2019, <https://datatracker.ietf.org/doc/html/draft-ietf-bess-evpn-yang-07>.

Authors' Addresses

Saumya Dikshit
Aruba Networks, HPE
Mahadevpura
Bangalore 560 048
Karnataka
India
Email: saumya.dikshit@hpe.com

Mukul Srivastava
Hewlett Packard Enterprise
10 Technology Park Dr
Westford, MA 01886
United States of America
Email: mukul.srivastava@hpe.com

Changwang Lin
New H3C Technologies
8 Yongjia North Road
Beijing
Haidian District, 100094
China
Email: linchangwang.04414@h3c.com