**Multi-Threaded Routing Toolkit (MRT) Routing Information Export Format
with BGP Additional Paths Extensions
draft-petrie-grow-mrt-add-paths-00**

Abstract

   This document updates the Multi-threaded Routing Toolkit (MRT) export
   format for Border Gateway Protocol (BGP) routing information by
   extending it to support the Advertisement of Multiple Paths in BGP
   extensions.

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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   material or to cite them other than as "work in progress."

   This Internet-Draft will expire on April 13, 2016.

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1. Introduction

   Researchers and engineers often wish to analyze network behavior by
   studying routing protocol transactions and routing information base
   snapshots. To this end, the MRT record format [RFC6396] was
   developed to encapsulate, export, and archive this information in a
   standardized data representation.

   The Advertisement of Multiple Paths in BGP [I-D.ietf-idr-add-paths]
   defines a BGP extension to allow the advertisement of multiple paths
   for the same address prefix without the new paths implicitly
   replacing any previous ones. The essence of the extension is that
   each path is identified by a path identifier in addition to the
   addres prefix

   This memo documents an optional extension to the MRT format RFC6396
   [RFC6396] and introduces additional definitions of MRT Subtype fields
   to permit representation of Multiple Path advertisements

2. Requirements Language

   The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
   "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
   document are to be interpreted as described in RFC 2119 [RFC2119].

3. Rationale

   When a BGP message requires information about the capabilities
   negotiated during the setup of the BGP session for a parser to
   interpret the message, this information is carried by the MRT
   subtypes.

The MRT specification defines the following BGP4MP subtypes:

o   BGP4MP_MESSAGE

o   BGP4MP_MESSAGE_AS4

o   BGP4MP_MESSAGE_LOCAL

o   BGP4MP_MESSAGE_AS4_LOCAL

These indicate to a parser whether the AS_PATH and AGGREGATOR
attributes should be interpretted according to the rules in RFC6793
[RFC6793]

Additional Paths in BGP [I-D.ietf-idr-add-paths] alters the encoding
of the BGP NLRI format for withdraws and announcements. Therefore
new BGP4MP subtypes are required to signal to a parser how to parse
the NLRI.

The MRT specification defines the following TABLE_DUMP_V2 subtypes:

o   RIB_IPV4_UNICAST

o   RIB_IPV4_MULTICAST

o   RIB_IPV6_UNICAST

o   RIB_IPV6_MULTICAST

o   RIB_GENERIC

The existing TABLE_DUMP_V2 AFI/SAFI-Specific RIB Subtypes specify
that the Prefix Length and Prefix fields are encoded in the same
manner as the BGP NLRI encoding. These also require new subtypes to
retain the path identifier information in Additional Paths.

The TABLE_DUMP_V2 RIB_GENERIC subtype contains a single raw NLRI
entry, the encoding of which is defined by the AFI and SAFI.
Additional Paths alter the NLRI encoding. Therefore a new subtype is
required to indicate the change in NLRI format.

4. **MRT Subtypes for Type BGP4MP**

This document defines the following new Subtypes:

o   BGP4MP_MESSAGE_AP

o   BGP4MP_MESSAGE_AS4_AP

o   BGP4MP_MESSAGE_LOCAL_AP

o   BGP4MP_MESSAGE_AS4_LOCAL_AP

The fields of these message types are identical to the equivalent
non-additional-path versions specified in RFC 6396 [RFC6396], and
continues to encapsulate the entire BGP message in the BGP Message
field.

5. MRT Subtypes for Type TABLE_DUMP_V2

This document defines the following new Subtypes:

o   RIB_IPV4_UNICAST_AP

o   RIB_IPV4_MULTICAST_AP

o   RIB_IPV6_UNICAST_AP

o   RIB_IPV6_MULTICAST_AP

o   RIB_GENERIC_AP

The fields of these message types are identical to the equivalent
non-additional-path versions specified in RFC 6396 [RFC6396].
However, for the specific case of the 4 AFI/SAFI specific RIB
Subtypes, the existing RIB Entries field is re-defined as detailed in
the sections below.

5.1. AFI/SAFI specific RIB Subtypes

In order to preserve the record compaction achieved by using the most
common subtypes, and allowing multiple RIB entries to be stored in a
single TABLE_DUMP_V2 record, the existing RIB Entries field is
redefined for use within the new AFI/SAFI specific RIB Subtypes
defined by this document as follows:

```
     0                   1                   2                   3
     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
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |           Peer Index          |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                        Originated Time                       |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                        Path Identifier                       |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |        Attribute Length       |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                      BGP Attributes... (variable)
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
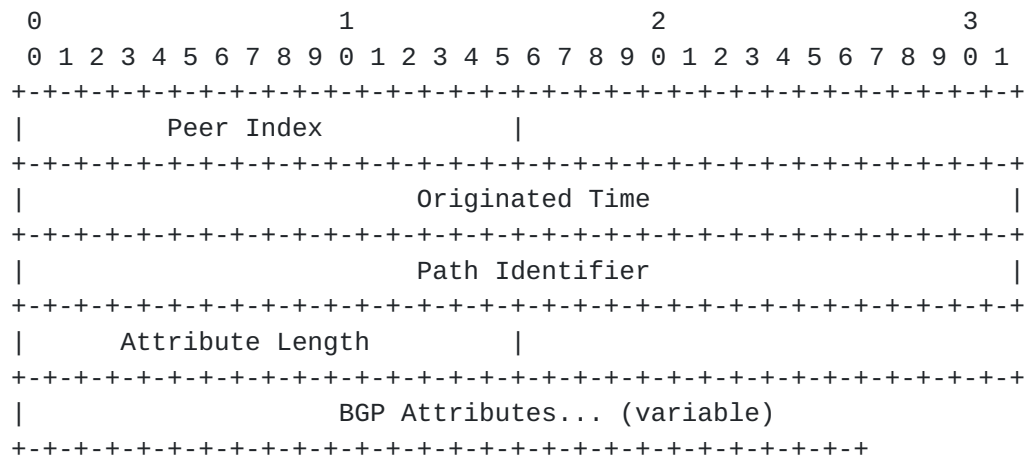
Figure 1: RIB Entries for AFI/SAFI-specific RIB Subtypes with
additional-paths support

This adds a field to the RIB Entries record, to store the Path
Identifier, when used with the RIB_IPV4_UNICAST_AP,
RIB_IPV4_MULTICAST_AP, RIB_IPV6_UNICAST_AP and RIB_IPV6_MULTICAST_AP
Subtypes

5.2. RIB_GENERIC_AP Subtype

The fields of this message types is identical to the equivalent non-
additional-path versions specified in RFC 6396 [RFC6396], and
continues to encapsulate the raw AFI/SAFI/NLRI in the record, and the
raw attributes in the RIB Entries.

The RIB entries are unchanged, and should be interpreted according to
RFC 6396 [RFC6396]

6. IANA Considerations

This document requests that IANA add the appropriate Type Codes and
Subtype Codes (to be assigned). This is currently a placeholder.

7. Security Considerations

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

However, the security considerations of RFC6396 [RFC6396] are equally
applicable to this document, and this document permits the export of
more detailed routing data.

An organisation which uses the MRT format to store their BGP routing
information should be aware that supporting these extensions permits

more detailed network path information to be stored, and should
consider the implications of this within their environment

An network that peers with public BGP collectors, and enable the
additional-paths capability on a the peering session, should be aware
that they are exporting not only their best paths, but potentially
other paths within their network. The BGP peer should consider any
implications of exposing this additional data.

8. References

8.1. Normative References

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8.2. Informative References

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Author's Address

   Colin Petrie
   RIPE NCC
   Amsterdam
   NL

   Email: cpetrie@ripe.net