                   Analysis of Existing work for I2NSF
                     draft-ietf-idr-aspath-orf-12.txt

Abstract

   This document defines a new Outbound Router Filter type for BGP,
   termed "Aspath Outbound Route Filter", that can be used to perform
   aspath based route filtering. This ORF-type supports aspath based
   route filtering as well as regular expression based matching, for
   address groups.

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1. Introduction

   The Cooperative Outbound Route Filtering Capability defined in
   [RFC5292] provides a mechanism for a BGP speaker to send to its BGP
   peer a set of Outbound Route Filters (ORFs) that can be used by its
   peer to filter its outbound routing updates to the speaker.

   This documents defines a new ORF-type for BGP, termed "ASpath
   Outbound Route Filter (ASpath ORF)", that can be used to perform AS
   Path based route filtering. The ASpath ORF supports AS path route
   filtering as well as the regular expression based matching for
   address groups.

2. ASpath ORF-Type

   The ASpath ORF-Type allows one to express ORFs in terms of regular
   expression and AS path numbers. That is, it provides AS path based
   route filtering, including regular expression based matching.

   Conceptually an ASpath ORF entry consists of the fields <Sequence,
   Match, Length, Aspath>.

      The "Sequence" field is a number that specifies the relative
      ordering of the entry.

      The "Match" field specifies whether this entry is "PERMIT" (value
      0), or "DENY" (value 1).

   The "Length" field indicates the length of AS path regular
   expression string.

   The "aspath" field contains an AS path regular expression of an
   address group.

   The field "Sequence" is an unsigned 32 bit value. The field
   "Length" is an unsigned 16 bit value. The field "aspath" is a
   variable length hexadecimal string. The field "aspath" will be
   followed by enough trailing bits to make end of field fall on an
   octet boundary. Note that the value of trailing bits is
   irrelevant.

3. ASpath ORF encoding

   The value of the ORF-Type for the ASpath ORF-Type is <TBD>.

   An ASpath ORF entry is encoded as follows. The "Match" field of the
   entry is encoded in the "Match" field of the common part [RFC5292],
   and the remaining fields of the entry is encoded in the "Type
   specific part" as follows:

```
        +-------------------------------+
        |    Sequence (4 octets)        |
        +-------------------------------+
        |   Length   (2 octet)          |
        +-------------------------------+
        |   Aspath   ( variable length) |
        +-------------------------------+
```

   Note the aspath is a variable length hexadecimal string whose length
   is defined by Length field.

4. Capability Specification for Cooperative route filtering with ASpath

   As specified in Cooperative Route Filter[RFC5292], a BGP speaker that
   is willing to receive ORF entries from its peer, or a BGP speaker
   that would like to send ORF entries to its peer advertises this to
   the peer by using the Cooperative Route Filtering Capability uses a
   new BGP capability [RFC3392] defined as follows:

   Capability code: 3

   Capability length: variable

   Capability value: one or more of the following entries:

```
+----------------------------------------------------+
| Address Family Identifier (2 octets)               |
+----------------------------------------------------+
| Reserved (1 octet)                                 |
+----------------------------------------------------+
| Subsequent Address Family Identifier (1 octet)     |
+----------------------------------------------------+
| Number of ORFs (1 octet)                           |
+----------------------------------------------------+
| ORF Type (1 octet)                                 |
+----------------------------------------------------+
| Send/Receive (1 octet)                             |
+----------------------------------------------------+
| ...                                                |
+----------------------------------------------------+
| ORF Type (1 octet)                                 |
+----------------------------------------------------+
| Send/Receive (1 octet)                             |
+----------------------------------------------------+
```
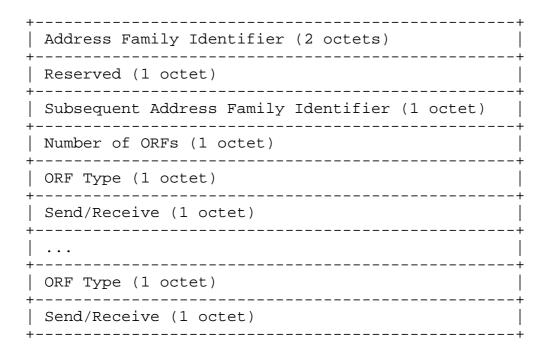
               Fig 4. Capability encoding

   The use and meaning of these fields are as follows:

      Address Family Identifier (AFI)

         This field carries the identity of the address family for the
         Network Layer protocol associated with the Network Address that
         follows.

      Subsequent Address Family Identifier (SAFI):

         This field provides additional information about the type of
         the Network Layer Reachability Information carried in the
         attribute.

      Number of ORF Types

         This field contains the number of Filter Types to be listed in
         the following fields.

      ORF Type

         This field contains the value of an ORF Type.

      Send/Receive

This field indicates whether the sender is (a) willing to
receive ORF entries from its peer (value 1), (b) would like to
send ORF entries to its peer (value 2), or (c) both (value 3)
for the ORF Type that follows.

In the upper bits of the Send/Receive byte the top three bits
have the following encoding: [FFFKKKSR] where bit 0 is the left
most bit.

where:

   S = Send ORF for ASpath

   R = Receive ORF for ASpath

   KKK = a 3 bit field reserved for future expansion of regular
   expression differences in ORF.

   FFF = 3 bits.

      Bit 0 is the left most bit, and indicates anchoring
      status.

         Bit 0 = 0 - implies full length regular express
         (regex), that is implicit anchoring of ASPath as in
         "^ASPath$"

            anchoring--non-anchoring

            ^X --------> X .*

            ^X$ --------> X

            X ----------> .* X .*

         Bit 0 = 1 - implies partial aspath regex, regex may or
         may not have anchors

      Bit 1 is the middle bit, and it is the "." wildcard
      operator. [Collating Element]

         Bit 1 = 0 -- indicates traditional application of "."
         as wildcard, ie: "." matches any single character of
         the set [0-9].

         Bit 1 = 1 -- indicates "." matches an AS-path token/
         term, regex "." == traditional regex "[0-9]+"

Bit 2 is the right most bit, and indicates the "[]"
operator where:

Bit 2 = 0 - indicates not supported

Bit 2 = 1 - indicates support, e.g. [0-9]

5. ASpath ORF Matching

In addition to the general matching rules defined in [RFC5292],
several ASpath ORF specific matching rules are defined as follows.

It is possible that the speaker would have more than one ASpath ORF
entry that matches the route. In that case the "first-match" rule
applies. That is, the ORF entry with the smallest sequence number
among all the matching ORF entries) is considered as the sole match,
and it would determine whether the route should be advertised.

If any speaker does not support capabilities specified by the
receiver but still decide to establish the connection, the receiver
is expected to translate the AS path regular expressions to the its
(receiver's) interpretation of regular expressions as indicated in
the capability announcement.

6. Error handling

ORFs provide information that guides future sending, but any
malformed ORF is simply missed filtering information. If ASpath ORF
is malformed, the attribute shall simply be discarded.

7. Security Considerations

This extension to BGP does not change the underlying security issues.

8. Acknowledgements

We express our thanks to Andrew Partan, Avneesh Sachdev, Alec
Peterson, Enke Chen, John Heasley, Dorian Kim and Bruce Cole for
their comments.

9. IANA Considerations

No IANA exist for this document.

10. Security Considerations

   No security considerations are involved with a gap analysis.

11. Normative References

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