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Aspath Based Outbound Route Filter for BGP-4

draft-ietf-idr-aspath-orf-09.txt

1. **Status of this Memo**

2. **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.

3. Introduction

The Cooperative Outbound Route Filtering Capability defined in [BGP-ORF] 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 Aspath based route filtering. The Aspath ORF supports Aspath route filtering as well as the regular expression based matching for address groups.

4. Aspath ORF-Type

The Aspath ORF-Type allows one to express ORFs in terms of regular expression and aspath numbers. That is, it provides aspath 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 aspath regular expression string.

The "Aspath" field contains an aspath 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 boundry. Note that the value of trailing bits is irrelevant.

5. **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
   [BGP-ORF], 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 that the Aspath field is varibale length hexadecimal string
   whose length is defined by Length field.

6. **Capability Specification for Cooperative route filtering with ASpath**

   As specified in the Coperative Router filtering draft
   [draft-ietf-idr-route-filter-05.txt], 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 [BGP-CAP] 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 Network Layer protocol
         associated with the Network Address that follows. Presently
         defined values for this field are specified in RFC1700 (see the
         Address Family Numbers section).

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

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

   Where FFF indicates 3 bits. Bit 0 is the left most bit,
   Bit 1 is the middle bit and Bit 2 is the right most bit.

   bit 0 - anchors
     0 - full length regex, ie: implicit anchoring of AsPath as in
          ^AsPath$
     1 - partial as-path regex with anchoring. ie: the regex may
         or may not have anchors and thus may be a partial match.
         eg:
          anchoring   non-anchoring
          ^X   ->   X .*
          ^X$ ->   X
          X   ->   .* X .*

  bit 1 - "." wildcard operator [Collating Element]
     0 - traditional application of "." as wildcard, ie: "." matches
         any single character of the set [0-9].

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


      bit 2 - "[]" operator
         0 - not supported.
         1 - supported, eg: [0-9]
```

7. Aspath ORF Matching

   In addition to the general matching rules defined in [BGP-ORF],
   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 Aspath regular
   expressions to the its (receiver's) interpretation of regular
   expressions as indicated in the capability announcement.

7. Security Considerations

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

8. Acknowledgements

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9. References

[BGP-4] Rekhter, Y., and T. Li, "A Border Gateway Protocol 4 (BGP-4)", RFC 1771, March 1995.

[BGP-ORF] Chen, E., and Rekhter, Y., "Cooperative Route Filtering Capability for BGP-4", draft-ietf-idr-route-filter-05.txt, January 2002.

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