Abstract

This document defines a new Outbound Router Filter (ORF) type for BGP, termed "Address Prefix Outbound Route Filter", that can be used to perform address prefix based route filtering. This ORF-type supports prefix length or range based matching, wild-card based address prefix matching, as well as the exact address prefix matching for address families.
1. Introduction

The 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 document defines a new ORF-type for BGP, termed "Address Prefix Outbound Route Filter (Address Prefix ORF)", that can be used to perform address prefix based route filtering. The Address Prefix ORF supports prefix length or range based matching, wild-card based address prefix matching, as well as the exact address prefix matching for address families [BGP-MP].

2. Address Prefix ORF-Type

The Address Prefix ORF-Type allows one to express ORFs in terms of address prefixes. That is, it provides address prefix based route filtering, including prefix length or range based matching, as well as wild-card address prefix matching.

Conceptually an Address Prefix ORF entry consists of the fields <Sequence, Match, Length, Prefix, Minlen, Maxlen>.

The "Sequence" field specifies the relative ordering of the entry among all the Address Prefix ORF entries.

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

The "Length" field indicates the length in bits of the address prefix. A length of zero indicates a prefix that matches all (as specified by the address family) addresses (with prefix itself of zero octets).

The "Prefix" field contains an address prefix of an address family.

The "Minlen" field indicates the minimum prefix length in bits that is required for "matching". The field is considered as un-specified with value 0.

The "Maxlen" field indicates the maximum prefix length in bits that is required for "matching". The field is considered as un-specified with value 0.

The fields "Sequence", "Length", "Minlen", and "Maxlen" are all unsigned integers.
This document imposes the following requirement on the values of these fields:

0 <= Length < Minlen <= Maxlen

However, tests related to the "Minlen" or "Maxlen" value should be omitted when the "Minlen" or "Maxlen" field (respectively) is unspecified.

In addition, the "Maxlen" value must be no more than the maximum length (in bits) of a host address for a given address family [BGP-MP].

3. Address Prefix ORF Encoding

The value of the ORF-Type for the Address Prefix ORF-Type is 64.

An Address Prefix 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 shown in Figure 1.

```
+--------------------------------+
|   Sequence (4 octets)          |
+--------------------------------+
|   Minlen   (1 octet)           |
+--------------------------------+
|   Maxlen   (1 octet)           |
+--------------------------------+
|   Length   (1 octet)           |
+--------------------------------+
|   Prefix   (variable length)   |
+--------------------------------+
```

Figure 1: Address Prefix ORF Encoding

Note that the Prefix field contains the address prefix followed by enough trailing bits to make the end of the field fall on an octet boundary. The value of the trailing bits is irrelevant.
4. Address Prefix ORF Matching

In addition to the general matching rules defined in [BGP-ORF], several Address Prefix ORF specific matching rules are defined as follows.

Consider an Address Prefix ORF entry, and a route maintained by a BGP speaker with NLRI in the form of <Prefix, Length>.

The route is considered as "no match" to the ORF entry if the NLRI is neither more specific than, nor equal to, the <Prefix, Length> fields of the ORF entry.

When the NLRI is either more specific than, or equal to, the <Prefix, Length> fields of the ORF entry, the route is considered as a match to the ORF entry only if the NLRI match condition as listed in Table 1 is satisfied.

<table>
<thead>
<tr>
<th>ORF Entry</th>
<th>NLRI Match Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>un-spec.</td>
<td>NLRI.length == ORF.length</td>
</tr>
<tr>
<td>specified</td>
<td>NLRI.length &gt;= ORF.Minlen</td>
</tr>
<tr>
<td>un-spec.</td>
<td>NLRI.length &lt;= ORF.Maxlen</td>
</tr>
<tr>
<td>specified</td>
<td>NLRI.length &gt;= ORF.Minlen AND NLRI.length &lt;= ORF.Maxlen</td>
</tr>
</tbody>
</table>

Table 1: Address Prefix ORF Matching

When more than one Address Prefix ORF entry match the NLRI of the route, 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.

The assignment of the sequence numbers is a local matter for the BGP speaker that sends the Address Prefix ORF entries.
5. IANA Considerations

This document specifies a new Outbound Route Filtering (ORF) type, Address Prefix ORF. The value of the ORF-type is 64.

6. Security Considerations

This extension to BGP does not change the underlying security issues [BGP-4].

7. Normative References


8. Author Information

Enke Chen
Cisco Systems, Inc.
170 W. Tasman Dr.
San Jose, CA 95134
EMail: enkechen@cisco.com

Srihari R. Sangli
Cisco Systems, Inc.
170 W. Tasman Dr.
San Jose, CA 95134
EMail: rsrihari@cisco.com
9. Intellectual Property Considerations

The IETF takes no position regarding the validity or scope of any Intellectual Property Rights or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; nor does it represent that it has made any independent effort to identify any such rights. Information on the procedures with respect to rights in RFC documents can be found in BCP 78 and BCP 79.

Copies of IPR disclosures made to the IETF Secretariat and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this specification can be obtained from the IETF on-line IPR repository at http://www.ietf.org/ipr.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at ietf-ipr@ietf.org.

10. Full Copyright Notice

Copyright (C) The IETF Trust (2008).

This document is subject to the rights, licenses and restrictions contained in BCP 78, and except as set forth therein, the authors retain all their rights.

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY, THE IETF TRUST AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.