                    Populate to FIB Action for FlowSpec
                   draft-li-idr-flowspec-populate-to-fib-02

Abstract

   A bit, F bit, is defined in traffic action extended community, which
   is used by FlowSpec to indicate the associated specifications be
   populated in FIB (Forwarding Information Base) after appropriate
   process.

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1. Introduction

BGP FlowSpec [RFC5575] provides a flexible mechanism to distribute
traffic flow specifications, where the matching rules are encoded in
the Border Gateway Protocol Network Layer Reachability Information
(BGP NLRI) with defined new format and the corresponding actions are
encoded in BGP Extended communities.

In routers, traffic flow specifications distributed by BGP FlowSpec
[RFC5575] are stored in distinct set of RIBs (Routing Information
Base) according to their (AFI, SAFI) pairs. These RIBs are then
populated to the dedicated hardware (most of them are TCAM based)
usually shared with ACLs (Access Control Lists). The dedicated
hardware is much more expensive and space limited when compared with
the hardware used to store the FIB (Forwarding Information Base),
which is usually sufficient to fit several millions of FIB entries.
Although in some implementations, the hardware used to populate
traffic flow specifications and FIB entries is the same, the size for
each parts is fixed at design stage. As the number of ACL rules and
FlowSpec specifications increases, especially when FlowSpec is used
for dynamic traffic flow steering, which is one of the three BGP
FlowSpec applications listed in [RFC5575] and
[I-D.ietf-idr-rfc5575bis], hardware space requirement of FlowSpec
specifications in the field network may exceed the size of the
dedicated hardware. To save the limited and expensive space of the
dedicated hardware, it is better to populate some FlowSpec
specifications to FIB if possible. The destination prefix based
FlowSpec specifications, for example, are suitable to be populated to
FIB.

However, there is no method in the current version of BGP FlowSpec
[RFC5575] and RFC5575bis [I-D.ietf-idr-rfc5575bis] to indicate the
associated specifications are suitable to be populated to FIB. This

document defines a new bit, F bit (populate to FIB), in 0x8007
traffic action extended community to satisfy the requirement.

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 [RFC2119].

3. Populate to FIB Action

F bit, populate to FIB bit, is defined in 0x8007 traffic action
extended community [RFC5575] to indicate the associated BGP FlowSpec
specifications are suitable to be populated to FIB. Thus the space
of the dedicated hardware that is used to store the BGP FlowSpec
specifications can be saved for other kinds of BGP FlowSpec
specifications and ACL rules.

The encoding format of the traffic action extended community with F
bit is shown below. The F bit is solicited to be assigned by IANA.

```
            40  41  42  43  44  45  46  47
           +---+---+---+---+---+---+---+---+
           |       reserved    | F | S | T |
           +---+---+---+---+---+---+---+---+
```

Traffic-action extended community consists of 2 bytes for type and
subtype, the value of which MUST be 0x8007, and 6 bytes for value, of
which only the 3 least significant bits of the 6th byte (from left to
right) are currently defined. S and T are defined in BGP FlowSpec
[RFC5575]. F is defined as:

o F: Populate to FIB Action (bit 45, to be assined by IANA): When
   this bit is set, the associated BGP FlowSpec specifications SHOULD
   be populated to FIB. If not set, the associated BGP FlowSpec
   specifications MUST NOT be populated to FIB. If this bit is set
   and the associated BGP FlowSpec specifications can not be
   populated to FIB, the associated BGP FlowSpec specifications MUST
   be ignored.

4. Implementation Considerations

FlowSpec rules are ordering sensitive. After ordering processing as
per section 5.1 of [RFC5575], they are searched sequentially until a
matching rule is found. FIB entries, on the contrary, have no
ordering implication. Longest prefix matching is the rule to choose
the matching FIB entry. Only the destination prefix based, F bit
tagged FlwoSpec rules that pass the validation (as per section 6 of

[RFC5575]) and ordering (as per section 5.1 of [RFC5575]) processing
are suitable to be populated into FIB. When populating a FlowSpec
rule into FIB, the following facts have to be taken into account.

o FlowSpec rules have higher priority than corresponding IGP and BGP
   routing entries.

o When populating the FIB, the FlowSpec rules with F bit tagged are
   preferred than the corresponding IGP and BGP routing entries.

o When a FlowSpec rule is being populated into FIB, the FIB entries,
   including those come from IGP or BGP updates, covered by this
   FlowSpec rule MUST be removed or replaced by this FlowSpec rule.

o The populated FlowSpec rules in the FIB MUST not be overridden by
   IGP or BGP updates.

5. Security Considerations

This document defines a new bit in the traffic action extended
community to indicate the associated BGP FlowSpec specifications
SHOULD be populated to FIB directly. This bit does not introduce any
new security issues. The same security considerations as for the BGP
FlowSpec [RFC5575] applies.

6. IANA Considerations

One bit, F bit, is solicited to be assigned from Traffic Action
Fields registry. This bit is used by BGP FlowSpec to indicate the
associated BGP FlowSpec specifications SHOULD be populated to FIB
directly.

7. Normative References

[I-D.ietf-idr-rfc5575bis]
          Hares, S., Loibl, C., Raszuk, R., McPherson, D., and M.
          Bacher, "Dissemination of Flow Specification Rules",
          draft-ietf-idr-rfc5575bis-06 (work in progress), October
          2017.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate
          Requirement Levels", BCP 14, RFC 2119,
          DOI 10.17487/RFC2119, March 1997,
          <https://www.rfc-editor.org/info/rfc2119>.

   [RFC5575] Marques, P., Sheth, N., Raszuk, R., Greene, B., Mauch, J.,
              and D. McPherson, "Dissemination of Flow Specification
              Rules", RFC 5575, DOI 10.17487/RFC5575, August 2009,
              <https://www.rfc-editor.org/info/rfc5575>.

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