

BGP Extensions for Routing Policy Distribution (RPD)

`draft-li-idr-flowspec-rpd-04`

Robin Li

Liang Ou

Yujia Luo

Sujian Lu

Huaimo Chen

Shunwan Zhuang

Haibo Wang

Overview

- Traffic-actions extended for RPD below

| | | | | | | | | | | | |
|---|---|---|---|---|----|----|----|----|----|----|----|
| 0 | 1 | 2 | | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 |
| +-----+-----+ | . | . | . | +-----+-----+-----+-----+-----+-----+-----+ | | | | | | | |
| | | | | | | | | | | | |
| +-----+-----+ | . | . | . | +-----+-----+-----+-----+-----+-----+-----+ | | | | | | | |
| S: Sample (bit 46), | | | | T: Terminal Action (bit 47) | | | | | | | |
| R: Routing Policy Distribution (Bit 45) | | | | | | | | | | | |

Traffic-actions with RPD (R) flag

BGP Wide Community for Routing Policy

- A new AFI and SAFI uses a new NLRI below

| | | | | | | | | | | | |
|--------|-------------|--------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| ++++++ | ++++++ | ++++++ | | | | | | | | | |
| | NLRI Length | | 1 octet | | | | | | | | |
| ++++++ | ++++++ | ++++++ | | | | | | | | | |
| | Policy Type | | 1 octet | | | | | | | | |
| ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ |
| | | | Distinguisher (4 octets) | | | | | | | | |
| ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ |
| | | | Peer IP (4/16 octets) | | | | | | | | |
| ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ |

BGP Wide Community for Routing Policy

Updates on BGP Wide Community: RouteAttr Atom

- A RouteAttr Atom TLV (or RouteAttr TLV/sub-TLV for short) is defined in Target TLV

```

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
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|   Type (TBD1)   |       Length (variable)          |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                           sub-TLVs
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

Format of RouteAttr Atom TLV

3 sub-TLVs: IP Prefix, AS-Path and Community

Updates on BGP Wide Community: IPv4 Prefix sub-TLV

- It represents a matching criteria on IPv4 prefixes

```
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Type (TBD2) | Length (N x 8) | M-Type | Flags |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|           IPv4 Address           |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|     Mask      |    GeMask    |    LeMask   | M-Type | Flags |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
~ . .
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|           IPv4 Address           |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|     Mask      |    GeMask    |    LeMask   |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
Format of IPv4 Prefix sub-TLV
```

M-Type for match type: 0 for exact match, 1 for match prefix \geq given mask, 2 for match prefix \leq given mask, 3 for match prefix in given range

E.g., $\langle M\text{-Type}=0, \text{IPv4Addr}=1.1.0.0, \text{Mask}=22, \text{GeMask}=0, \text{LeMask}=0 \rangle$: IP prefix exact match 1.1.0.0/22

$\langle M\text{-Type}=1, \text{IPv4Add}=16.1.0.0, \text{Mask}=24, \text{GeMask}=24, \text{LeMask} = 0 \rangle$
represents match IP prefix 1.1.0.0/24 ≥ 24 .

$\langle M\text{-Type}=3, \text{IPv4Addr}=18.1.0.0, \text{Mask}=24, \text{GeMask}=24, \text{LeMask}=32 \rangle$
represents match IP prefix 18.1.0.0/24 ≥ 24 and ≤ 32

Updates on BGP Wide Community: IPv6 Prefix sub-TLV

- It represents a matching criteria on IPv6 prefixes

```
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|      Type (TBD3)   |      Length (N x 20)          |M-Type | Flags |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|                               IPv6 Address (16 octets)                         ~
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|      Mask       |      GeMask     |      LeMask     |M-Type | Flags |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
~       . . .
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|                               IPv6 Address (16 octets)                         ~
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|      Mask       |      GeMask     |      LeMask     |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
```

Format of IPv6 Prefix sub-TLV

Updates on BGP Wide Community: AS-Path sub-TLV

- It represents a AS-Path matching criteria in a regular expression string

| | | | |
|---|---------------------|-----------------------|---|
| 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 | |
| +-+-+-+----+----+----+----+----+----+----+----+----+----+ | | | |
| Type (TBD4) | Length (Variable) | | |
| +-+-+-+----+----+----+----+----+----+----+----+----+----+----+----+ | | | |
| AS-Path Regex String | | | |
| : | | : | |
| | | ~ | |
| +-+-+-+----+----+----+----+----+----+----+----+----+----+----+----+ | | | |

Format of AS Path sub-TLV

Updates on BGP Wide Community: Community sub-TLV

- It represents a list of communities to be matched all

| | | | |
|---|---|---|---|
| 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 |
| +---+ | +---+ | +---+ | +---+ |
| Type (TBD5) Length (N x 4 + 1) Flags | +---+ | +---+ | +---+ |
| Community 1 Value | +---+ | +---+ | +---+ |
| ~ . . . ~ | +---+ | +---+ | +---+ |
| Community N Value | +---+ | +---+ | +---+ |
| +---+ | +---+ | +---+ | +---+ |

Format of Community sub-TLV

Updates on BGP Wide Community: MED and AS-Path change

- In Parameter TLV, 2 new sub-TLVs: MED change and AS-Path change are defined

| | | | |
|---------------------------|---------------------------|---------------------------|---------------------------|
| 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 |
| +-----+-----+-----+-----+ | +-----+-----+-----+-----+ | +-----+-----+-----+-----+ | +-----+-----+-----+-----+ |
| Type (TBD6) | Length (5) | OP | |
| +-----+-----+-----+-----+ | +-----+-----+-----+-----+ | +-----+-----+-----+-----+ | +-----+-----+-----+-----+ |
| Value | | | |
| +-----+-----+-----+-----+ | +-----+-----+-----+-----+ | +-----+-----+-----+-----+ | +-----+-----+-----+-----+ |

Format of MED Change sub-TLV

OP=0: assign the Value to the existing MED

OP=1: add the Value to the existing MED

OP=2: subtract the Value from the existing MED

Updates on BGP Wide Community: AS-Path change

```

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
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|   Type (TBD7)   |       Length (n x 5)       |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                           AS1                           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|   Count1   |
+---+---+---+---+---+
~         . . .
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                           ASn                           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|   Countn   |
+---+---+---+---+---+

```

Format of AS-Path Change sub-TLV

ASi: 4 octet. An AS number

Counti: 1 octet. ASi repeats Counti times

The sequence of AS numbers are added to the existing AS Path

Next Step

Comments