# BGP Route Policy and Attribute Trace Using BMP

draft-xu-grow-bmp-route-policy-attr-trace-01

Feng Xu, Tencent

**Yunan Gu**, Shunwan Zhuang, Zhenbin Li, Huawei
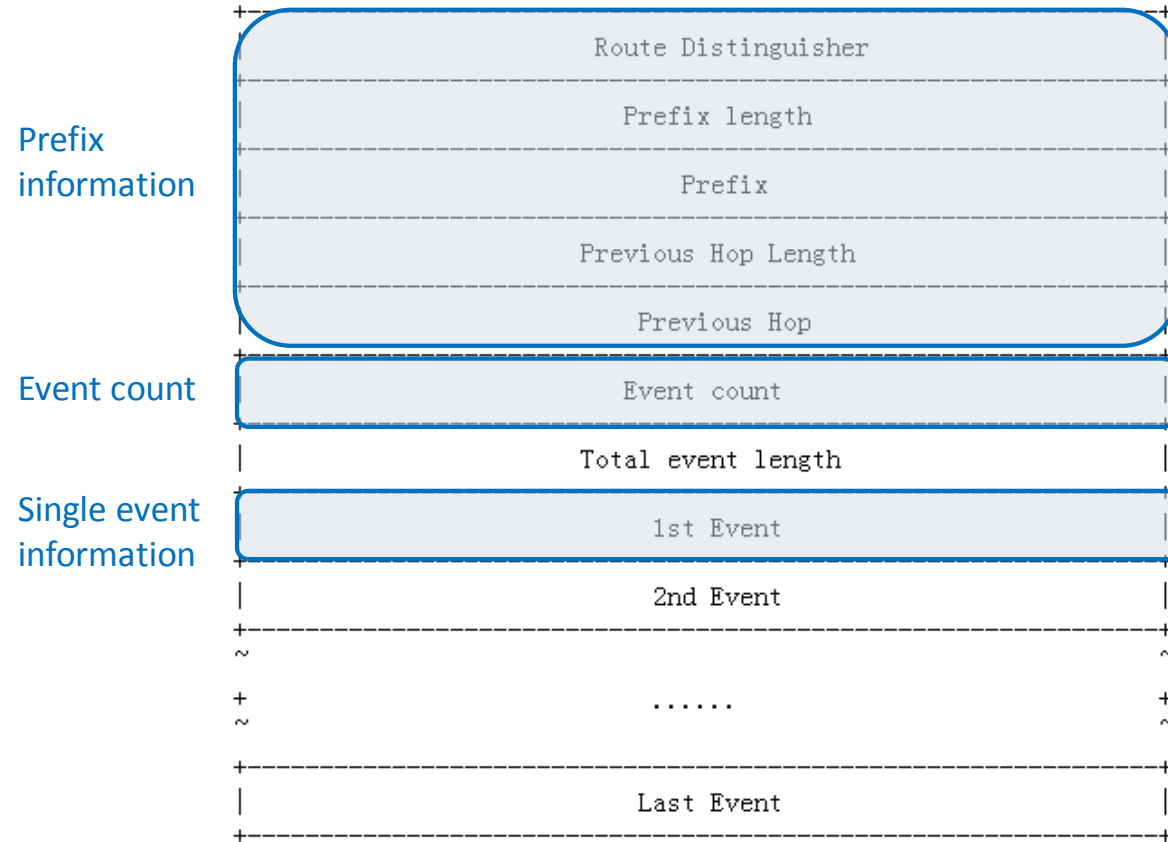
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# Recap

- ## What is it?
  - Tracking route policy processing as events, and encapsulated in BMP
  - E.g., *10.1.1.0/24* received from Peer 192.168.1.1 passed the *inbound* policy (Route Policy *CAP,* Item *100*) at time T1, with a *community attribute (100:1)* added

- ## Where is it used?
  1. Route policy validation
  2. Root cause analysis
  3. Route propagation tracing

# Changes from -00 to -01

1. New message structure: basic information part + flexible part
   - Basic information part: fixed length -- prefix, AFI/SAFI, timestamp and so on
   - Flexible part: TLV based -- each TLV is optional for saving bandwidth and user-specific visualization need
2. Flexible representation of route policy structure:
   - New structure allows chaining and recursion
3. Optional TLV:
   - A string type TLV: allows user-specific expression of policy name/ID, as well as the policy execution result.
   - Other usage: any user-specific info

# BMP RoFT Message

Prefix information

```
+-------------------------------------------------+
|                Route Distinguisher              |
+-------------------------------------------------+
|                  Prefix length                  |
+-------------------------------------------------+
|                      Prefix                     |
+-------------------------------------------------+
|                Previous Hop Length              |
+-------------------------------------------------+
|                   Previous Hop                  |
+-------------------------------------------------+
```

Event count

```
+-------------------------------------------------+
|                   Event count                   |
+-------------------------------------------------+
|                Total event length               |
+-------------------------------------------------+
```

Single event information

```
+-------------------------------------------------+
|                    1st Event                    |
+-------------------------------------------------+
|                    2nd Event                    |
+~-----------------------------------------------~+
~                                                 ~
+                     ......                      +
~                                                 ~
+-------------------------------------------------+
|                   Last Event                    |
+-------------------------------------------------+
```
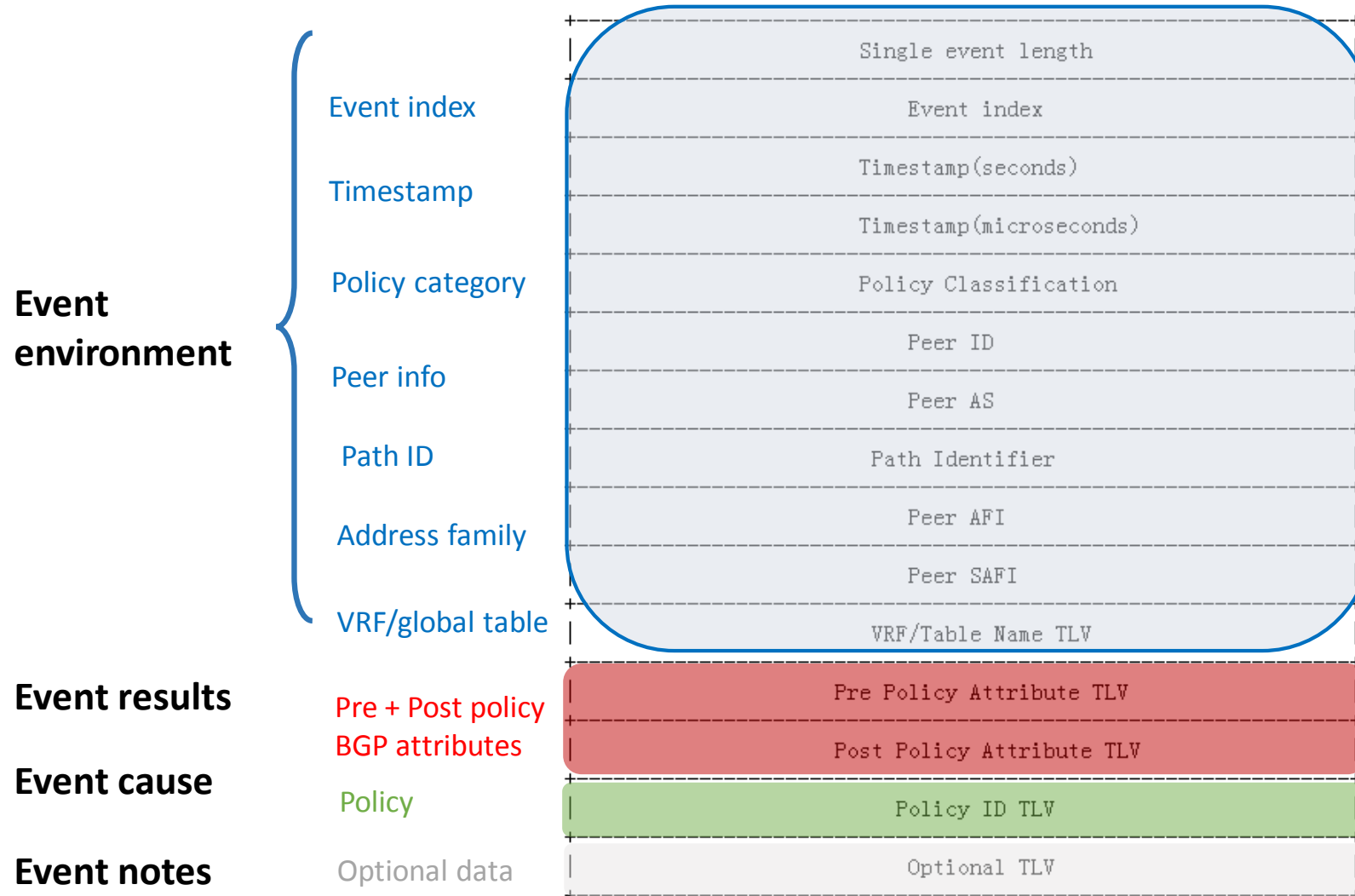
Optional, in case you don't this format of policy representation or you don't want policy info at all.
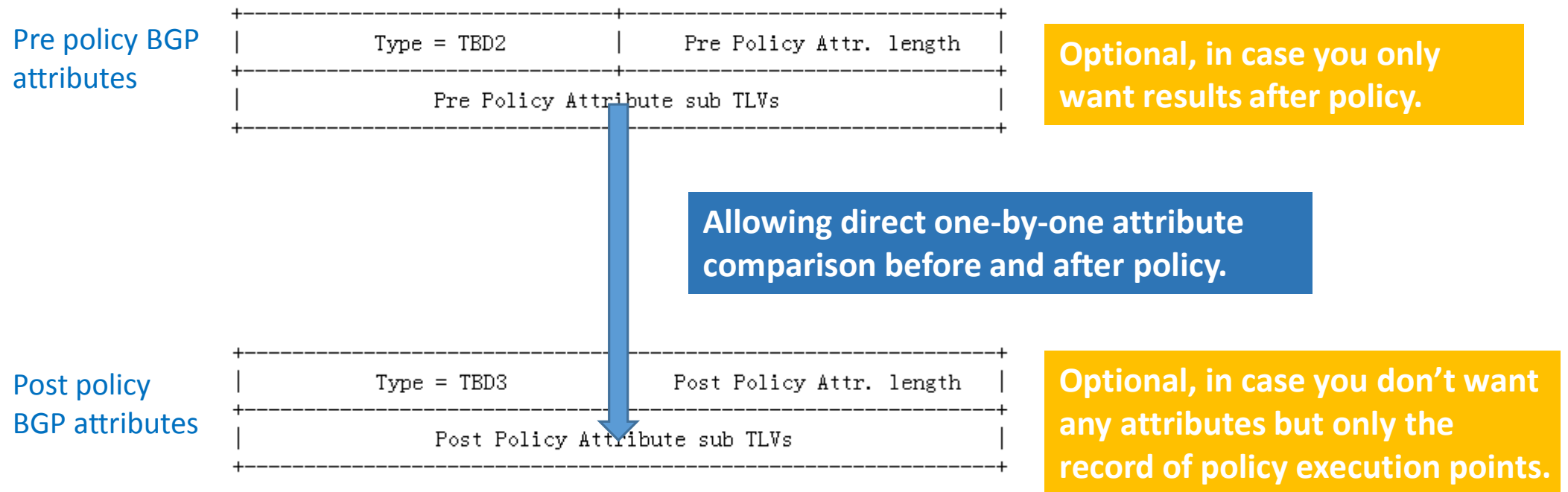
- Monitoring a subset of or all prefixes
- Event record triggered by policy processing action, e.g., a if-match hit
- One or multiple events per message

# Event Format



**Event environment**

- Event index
- Timestamp
- Policy category
- Peer info
- Path ID
- Address family
- VRF/global table

| |
|---|
| Single event length |
| Event index |
| Timestamp(seconds) |
| Timestamp(microseconds) |
| Policy Classification |
| Peer ID |
| Peer AS |
| Path Identifier |
| Peer AFI |
| Peer SAFI |
| VRF/Table Name TLV |

**Event results**

Pre + Post policy BGP attributes

| |
|---|
| Pre Policy Attribute TLV |
| Post Policy Attribute TLV |

**Event cause**

Policy

| |
|---|
| Policy ID TLV |

**Event notes**

Optional data
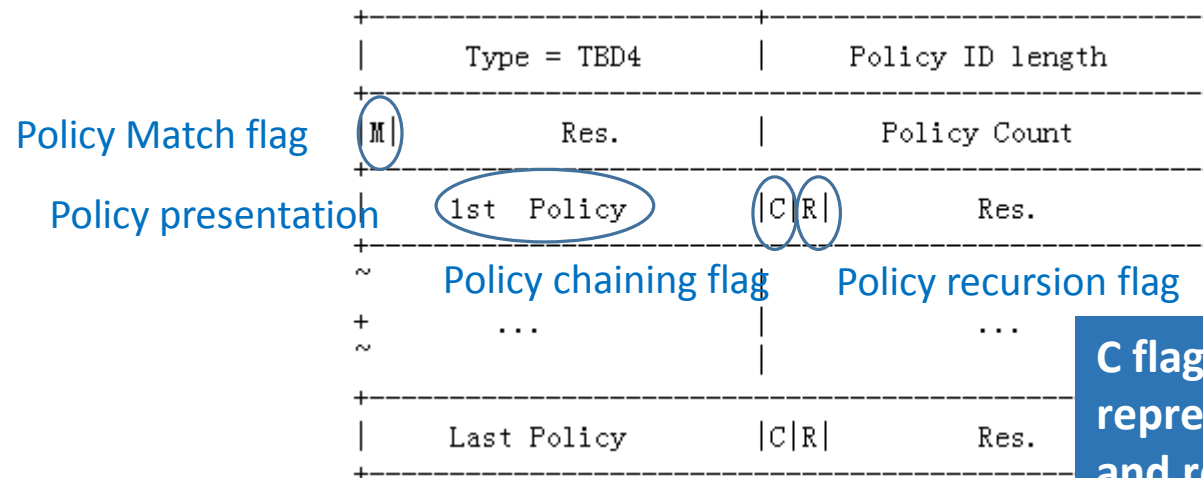
| |
|---|
| Optional TLV |

- **TLVs are optional**
  - **Pre-policy attribute TLV**
  - **Post-policy attribute TLV**
  - **Policy ID TLV**
  - **Optional TLV**
- **TLVs allow user-customized contents and format**

# Pre/Post Policy Attribute TLV



Pre policy BGP attributes

```
+---------------------------------+---------------------------------+
|  Type = TBD2                    |   Pre Policy Attr. length       |
+---------------------------------+---------------------------------+
|            Pre Policy Attribute sub TLVs                          |
+------------------------------------------------------------------+
```

Optional, in case you only want results after policy.

Allowing direct one-by-one attribute comparison before and after policy.

Post policy BGP attributes

```
+---------------------------------+---------------------------------+
|  Type = TBD3                    |   Post Policy Attr. length      |
+---------------------------------+---------------------------------+
|            Post Policy Attribute sub TLVs                         |
+------------------------------------------------------------------+
```

Optional, in case you don't want any attributes but only the record of policy execution points.

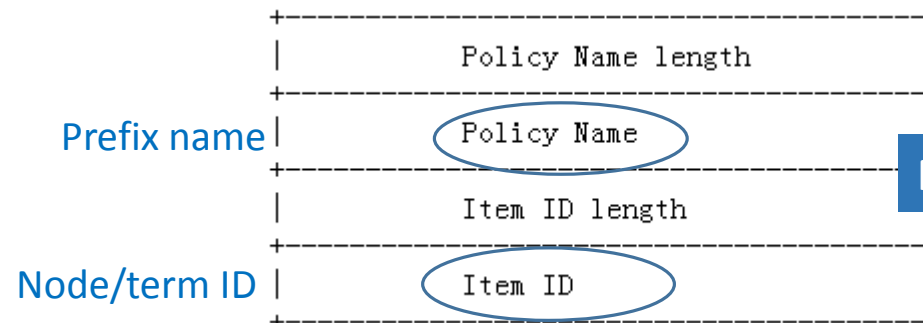# Policy ID TLV

Optional, in case you don't this format of policy representation or you don't want policy info at all.

```
+-----------------------------+-----------------------------+
|     Type = TBD4             |     Policy ID length        |
+-----------------------------+-----------------------------+
|M|        Res.               |       Policy Count          |
+-----------------------------+-----------------------------+
|   1st  Policy               |C|R|        Res.             |
+-----------------------------+-----------------------------+
~                             |                             ~
+            ...              |             ...             +
~                             |                             ~
+-----------------------------+-----------------------------+
|   Last Policy               |C|R|        Res.             |
+-----------------------------+-----------------------------+
```
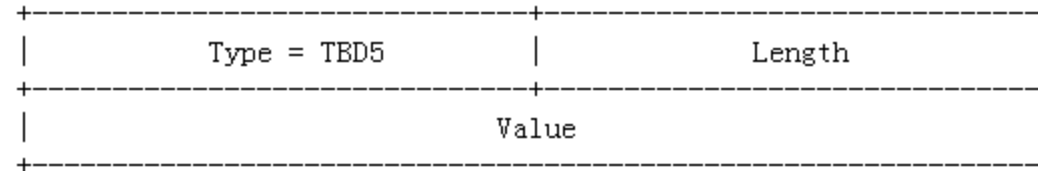
Policy Match flag

Policy presentation

Policy chaining flag     Policy recursion flag

C flag + R flag allow flexible representation of policy with chaining and recursion structure.

```
+-----------------------------------------------------------+
|                 Policy Name length                        |
+-----------------------------------------------------------+
|                   Policy Name                             |
+-----------------------------------------------------------+
|                  Item ID length                           |
+-----------------------------------------------------------+
|                    Item ID                                |
+-----------------------------------------------------------+
```

Prefix name

Node/term ID

Not touching the exact if-match conditions

# Optional TLV

Optional, in case you want to convey any user-specific info.

```
+----------------------------------+----------------------------------+
|          Type = TBD5             |            Length                |
+----------------------------------+----------------------------------+
|                            Value                                    |
+---------------------------------------------------------------------+
```

Possible usage: a string type TLV
- "Route rejected due to inbound filtering"
- What else?