BGP SR Policy Extensions to Enable IFIT

draft-qin-idr-sr-policy-ifit-04

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Fengwei Qin (China Mobile)
Hang Yuan (UnionPay)
Tianran Zhou (Huawei)
Giuseppe Fioccola (Huawei)
Yali Wang (Huawei)
Background and Motivation

- In-situ Flow Information Telemetry (IFIT) refers to dataplane on-path telemetry techniques, including In-situ OAM (IOAM) (draft-ietf-ippm-ioam-data) and Alternate Marking (RFC8321, RFC8889)

- An SR Policy is identified through the tuple <headend, color, endpoint>
  - A headend may be informed about a candidate path for an SR Policy by various means including:
    - via configuration,
    - PCE (draft-ietf-pce-segment-routing-policy-cp),

This document defines extensions to BGP to distribute SR policies carrying In-situ Flow Information Telemetry (IFIT) information.

So data plane on-path telemetry methods, like IOAM and Alternate Marking, can be enabled automatically when the SR policy is applied.
Changes from -02 to -04

Comments during IETF 108

• It is clarified the use of the term “IFIT” within the draft to avoid confusion. It stands for In-situ Flow Information Telemetry methodologies e.g. IOAM, Alt-Mark (comment from Joel Halpern)

• A new section in the draft describes routing/control plane considerations of IFIT to give a proper picture (comment from Ketan Talaulikar)

Inputs on the list

• Specify how to handle multiple IFIT sub-TLVs (comment from Huanan Chen)

• Definition of one general sub-TLV for IFIT while the different IFIT functions can be managed through sub-sub-TLVs (comment from Jie Dong)

• A new section on SR Policy Operations when receiving these IFIT sub-TLVs
IFIT Attributes in SR Policy

The new SR Policy encoding structure is reported below, and IFIT can be applied to the candidate path so that all the SR paths can be monitored in the same way.

- **IFIT attributes** can be attached at the candidate path level as sub-TLVs

SR Policy SAFI NLRI: <Distinguisher, Policy-Color, Endpoint>

Attributes:
- Tunnel Encaps Attribute (23)
  - Tunnel Type: SR Policy
  - Binding SID
  - Preference
  - Priority
  - Policy Name
  - Explicit NULL Label Policy (ENLP)
  - **IFIT Attributes**
  - Segment List
    - Weight
    - Segment
    - Segment
    ...
    ...

...
IFIT Attributes Sub-TLV

The format of the general IFIT Attributes Sub-TLV

```
+-----------------+-----------------+  
|     Type       |    Length       |  
+-----------------+-----------------+  
//
| sub-TLVs        |     //          |  
+-----------------+-----------------+  
```

sub-TLVs currently defined:

* IOAM Pre-allocated Trace Option Sub-TLV
* IOAM Incremental Trace Option Sub-TLV
* IOAM Directly Export Option Sub-TLV
* IOAM Edge-to-Edge Option Sub-TLV
* Enhanced Alternate Marking (EAM) sub-TLV
When IOAM is enabled, the IOAM header will be inserted into every packet of the traffic that is steered into the SR paths:

- **IOAM Pre-allocated Trace Option Sub-TLV**
  
<table>
<thead>
<tr>
<th>Type=1</th>
<th>Length=6</th>
<th>Namespace ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IOAM Trace Type</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flags</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rsvd</td>
</tr>
</tbody>
</table>

- **IOAM Incremental Trace Option Sub-TLV**
  
<table>
<thead>
<tr>
<th>Type=2</th>
<th>Length=6</th>
<th>Namespace ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IOAM Trace Type</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flags</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rsvd</td>
</tr>
</tbody>
</table>

- **IOAM Directly Export Option Sub-TLV**
  
<table>
<thead>
<tr>
<th>Type=3</th>
<th>Length=12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Namespace ID</td>
</tr>
<tr>
<td></td>
<td>Flags</td>
</tr>
<tr>
<td></td>
<td>IOAM Trace Type</td>
</tr>
<tr>
<td></td>
<td>Rsvd</td>
</tr>
<tr>
<td></td>
<td>Flow ID</td>
</tr>
</tbody>
</table>

- **IOAM Edge-to-Edge Option Sub-TLV**
  
<table>
<thead>
<tr>
<th>Type=4</th>
<th>Length=4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Namespace ID</td>
</tr>
<tr>
<td></td>
<td>IOAM E2E Type</td>
</tr>
</tbody>
</table>
Alternate Marking Sub-TLVs

When Enhanced Alternate Marking is enabled Alt-Mark is applied to the traffic that is steered into the SR paths

- Enhanced Alternate Marking (EAM) sub-TLV

```
+------------------+-
| Type=5           |
| Length=4         |
+------------------+-
| FlowMonID        |
| Period           |
| Rsvd             |
```
SR Policy Operations with IFIT Attributes

This document complements SR Policy Operations described in draft-ietf-idr-segment-routing-te-policy by adding the IFIT Attributes.

• The addition of IFIT Attributes Sub-TLVs for the SR Policy NLRI is considered by a BGP speaker, but the implementation MAY ignore the unrecognized or unsupported IFIT sub-TLVs.

• SR Policy NLRIs that have been determined acceptable, usable and valid can be evaluated for propagation, including the IFIT information.

• The error handling actions are also described in draft-ietf-idr-segment-routing-te-policy.

• The validation of the IFIT Attributes sub-TLVs introduced in this document MUST be performed to determine if they are malformed or invalid. This is done by the SRPM.
Discussion & Next Steps

• WG adoption ongoing
  – Inputs from Dhruv Dhody to be addressed in the next revision:
    • Minor nits to be fixed
    • More text about error handling actions, IFIT start/stop/update and backward compatibility

• Welcome questions, comments

Thank you