BGP SR Policy Extensions to Enable IFIT

draft-ietf-idr-sr-policy-ifit-01

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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)

- A headend may be informed about a candidate path for an SR Policy by using BGP (draft-ietf-idr-segment-routing-te-policy).

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 can be enabled automatically when the SR policy is applied.
Changes after WG Adoption

Comments during IETF 109 and Adoption Call

• Inputs from Dhruv Dhody during WG adoption
  – More text about error handling actions, IFIT start/stop/update and backward compatibility

• Comment from Ketan Talaulikar: what types of Steering would be possible to be used for such SR Policies and how it is handled by the SRPM.

• Comment from Gyan Mishra: Alignment with “SR Policy and Tunnel Encapsulation Attribute” of draft-ietf-idr-segment-routing-te-policy

• Mike Koldychev: consider the case of different IFIT methods for each Segment Lists (draft-koldychev-pce-multipath).

• It has been added the AltMark Mode (HbH, DOH).
Summary of the changes in -01

Steering into an SR Policy
Once the IFIT attributes are signalled, if a packet arrives at the headend, based on the types of steering described in draft-ietf-spring-segment-routing-policy, it may get steered into an SR Policy where IFIT methods (IOAM or Alternate Marking) are applied.

IFIT possible cases: conservative strategy
✓ In case of empty IFIT Attributes Sub-TLV or more than one instance of the same sub-TLV, IFIT methods will not be activated.
✓ If two conflicting IOAM sub-TLVs are present it means that they are not usable and none of the two methods will be activated.

IFIT Attributes Validation
✓ The validation of the individual fields of the IFIT Attributes sub-TLVs are handled by the SRPM.

Backward compatibility
✓ An implementation that does not understand IFIT Attributes Sub-TLV can simply ignore it.

Error handling actions
As described in draft-ietf-idr-segment-routing-te-policy, a BGP Speaker MUST perform the syntactic validation of the SR Policy NLRI to determine if it is malformed, including the TLVs/sub-TLVs.
   – In case of any error detected, the "treat-as-withdraw" strategy MUST be applied.
IFIT Attributes in SR Policy

The **SR Policy encoding structure** has been updated according to draft-ietf-idr-segment-routing-te-policy.

- **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
  SRv6 Binding SID
  Preference
  Priority
  Policy Name
  Policy Candidate Path Name
  Explicit NULL Label Policy (ENLP)
  IFIT Attributes
  Segment List
  Weight
  Segment
  Segment
  ...
  ...
```

The format of the general IFIT Attributes Sub-TLV

```
+--------------------------+--------------------------+--------------------------+
|                          |                          |                          |
|                          |                          |                          |
|                          |                          |                          |
|                          |                          |                          |
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                          |                          |                          |
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                          |                          |                          |
```

**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
IOAM Sub-TLVs

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**
  - Type=1
  - Length=6
  - Namespace ID
  - IOAM Trace Type
  - Flags
  - Rsvd

- **IOAM Incremental Trace Option Sub-TLV**
  - Type=2
  - Length=6
  - Namespace ID
  - IOAM Trace Type
  - Flags
  - Rsvd

- **IOAM Directly Export Option Sub-TLV**
  - Type=3
  - Length=12
  - Namespace ID
  - Flags
  - IOAM Trace Type
  - Rsvd
  - Flow ID

- **IOAM Edge-to-Edge Option Sub-TLV**
  - Type=4
  - Length=4
  - Namespace ID
  - IOAM E2E Type
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                          |
|                                  |  | H|E|R                             |
```

New fields added:
H: A flag indicating that the measurement is Hop-By-Hop.
E: A flag indicating that the measurement is end to end.
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

• Work in progress to make the draft stable

• Welcome questions, comments

Thank you