BGP SR Policy Extensions to Enable IFIT

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

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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)

❑ 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**),
  ➢ 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, 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 **I**n-situ **F**low **I**nformation **T**elemetry 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

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 | Rsvd  |
+-----------------------------------+------+--------+-------+-------+
```
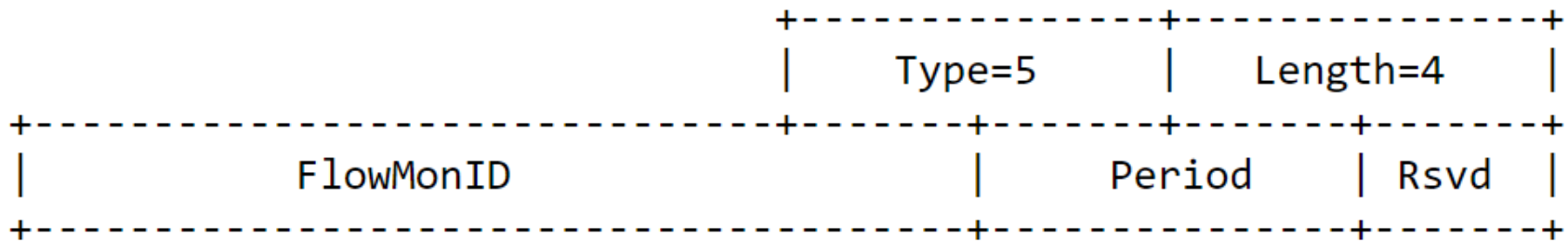
SR Policy Operations with IFIT Attributes

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