BGP Extension for Advertising In-situ Flow Information Telemetry (IFIT) Capabilities

draft-wang-idr-bgp-ifit-capabilities-01

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Background and Motivation

- 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).
  - To avoid IFIT-data leakage, the IFIT decapsulating node (tail node) must remove the data fields.
  - A head node must need to determine whether the tail node can support a specific IFIT-Capability before encapsulating IFIT in traffic packets.

- This document extensions to BGP to advertise the IFIT decapsulating node capabilities.
  - Extensions to IPv4/IPv6 Address Specific Extended Community
  - Extensions to BGP Next-Hop Capability

- Such advertisement would be useful for mitigating the leakage threat and determine whether a particular IFIT option type can be encapsulated in data packets.

IFIT Capabilities

- IFIT Capabilities is formed of a 16-bit bitmap as follows:
    - P-Flag: IOAM Pre-allocated Trace Option Type flag.
    - I-Flag: IOAM Incremental Trace Option Type flag.
    - D-Flag: IOAM DEX Option Type flag.
    - E-Flag: IOAM E2E Option Type flag.
    - M-Flag: Alternate Marking flag.

```
 0                   1
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|P|I|D|E|M|      Reserved       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
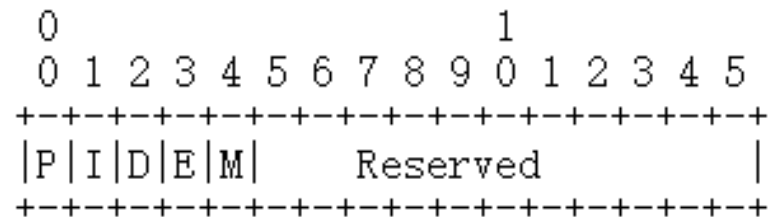
Figure 1. IFIT Capabilities

Option 1: Extensions to BGP Extended Community

- For IPv4/IPv6 networks, a new type of BGP Extended Community called **IPv4/IPv6-Address-Specific IFIT Extended Community**. It is **a transitive optional** extended community with type 0x01/0x00 and sub-type TBA.

- This new extended community can be used by the IFIT decapsulation node to notify its IFIT Capabilities to its partner (as the IFIT encapsulation node).
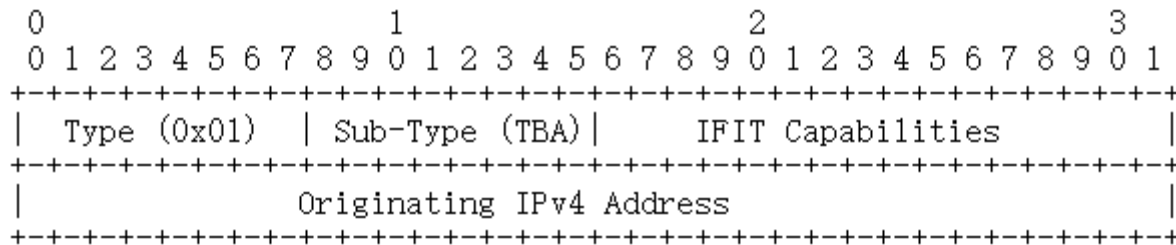
```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Type (0x01)  | Sub-Type (TBA)|      IFIT Capabilities         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Originating IPv4 Address                      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

    Figure 2.  IPv4-Address-Specific IFIT Extended Community
```

o IFIT Capabilities: as defined in previous section.

o Originating IPv4 Address: a IPv4 address of the IFIT decapsulation node.

```
 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 (0x00)  | Sub-Type (TBA)|      IFIT Capabilities         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Originating IPv6 Address                      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Originating IPv6 Address (cont.)              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Originating IPv6 Address (cont.)              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Originating IPv6 Address (cont.)              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

    Figure 3.  IPv6-Address-Specific IFIT Extended Community
```
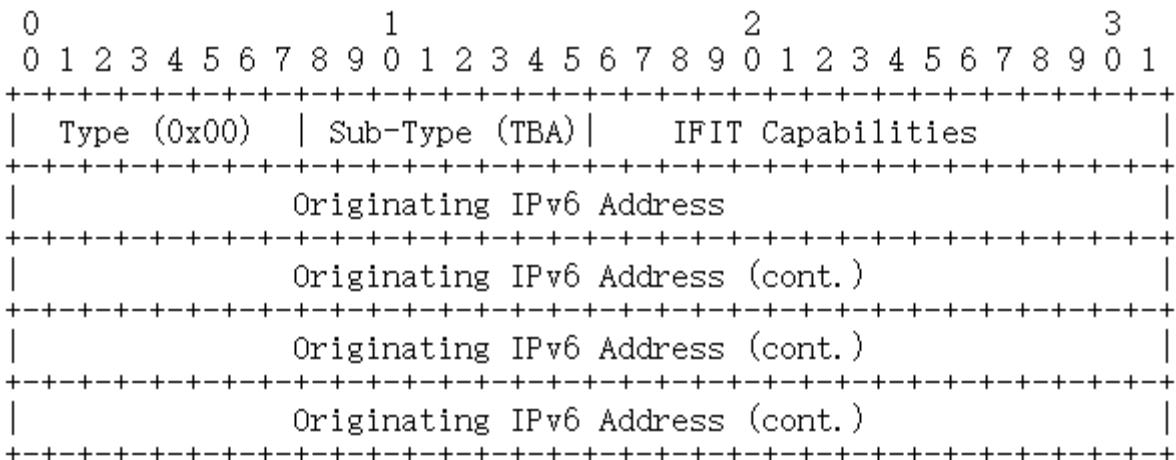
o Originating IPv6 Address: a IPv6 address of the IFIT decapsulation node.

Option 2: Extensions to BGP Next-Hop Capability

- **A new type of BGP Next-Hop Capability for IFIT** is extended as follows. It is **a non-transitive BGP attribute** with Capability Code (TBA).

- The inclusion of the IFIT Next-Hop Capability with the NLRI advertised in the BGP UPDATE.

- Indicates the BGP Next-Hop can act as the IFIT decapsulating node.

```
 0                   1
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Capability Code (2 octets)    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Capability Length (2 octets)  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Capability Value (variable)   |
~                               ~

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+


+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| IFIT Capabilities (2 octets)  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Originate IP Address          |
| (4 or 16 octets)              |
~                               ~

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
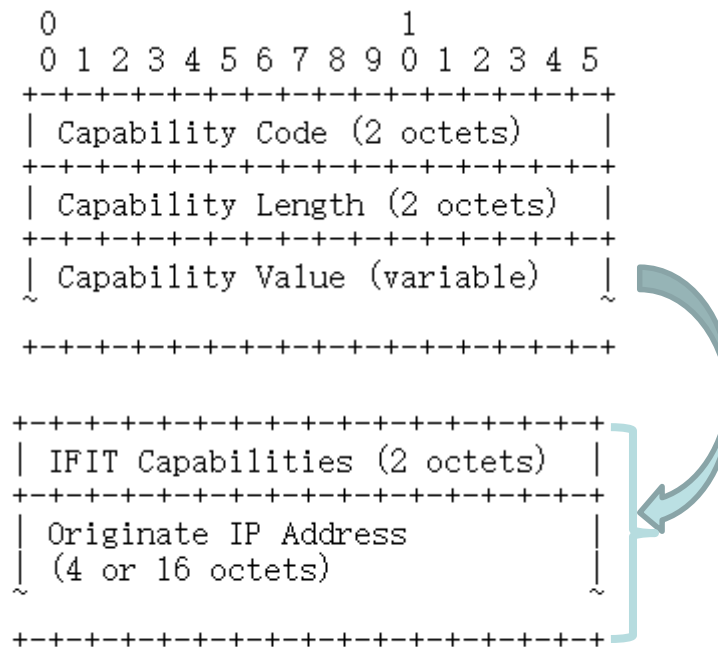
Figure 5. BGP Capability Value for IFIT

- Capability Value: a variable-length field, includes 2-octect IFIT Capabilities and Originate IP Address of the IFIT decapsulating node (IPv4 or IPv6 Address)

Next Steps

- Comments are welcome!
- Revise the document accordingly.

Thank you