Path Computation Element Communication Protocol (PCEP) Extensions to Enable IFIT

draft-chen-pce-pcep-ifit-04

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

The PCEP extension defined in this document allows to signal the IFIT capabilities. In this way IFIT methods are automatically activated and running.

The IFIT attributes can be generalized and included as TLVs carried inside the LSPA (LSP Attributes) object in order to be applied for all path types, as long as they support the relevant data plane telemetry method.
Latest Changes

• Specified the usage scenario of IFIT
IFIT is a solution focusing on specific network domains according to RFC8799.
  - For a number of reasons, such as policies, options supported, style of network management and security requirements, it is suggested to limit applications including the emerging IFIT techniques to a controlled domain.

• Improved Security Considerations section
IFIT data MUST be propagated in a limited domain to avoid malicious attacks. Solutions to ensure this requirement are respectively discussed in draft-ietf-ippm-ioam-data and draft-ietf-6man-ipv6-alt-mark.
  - A limited administrative domain provides the network administrator with the means to select, monitor and control the access to the network, making it a trusted domain also for the PCEP extensions defined in this document.
A new IFIT-CAPABILITY TLV, that is an optional TLV for use in the OPEN Object for IFIT attributes via PCEP capability advertisement.

```
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<table>
<thead>
<tr>
<th></th>
<th>Type</th>
<th>Length=4</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P</td>
<td>I</td>
<td>D</td>
</tr>
</tbody>
</table>
```

- **P**: IOAM Pre-allocated Trace Option Type-enabled flag (draft-ietf-ippm-ioam-data)
- **I**: IOAM Incremental Trace Option Type-enabled flag (draft-ietf-ippm-ioam-data)
- **D**: IOAM DEX Option Type-enabled flag (draft-ietf-ippm-ioam-data)
- **E**: IOAM E2E Option Type-enabled flag (draft-ietf-ippm-ioam-data)
- **M**: Alternate Marking enabled flag (RFC8321)

- If set to 1 by a PCC, the flag indicates that the PCC allows instantiation of the feature by a PCE
- If set to 1 by a PCE, the flag indicates that the PCE supports the feature instantiation
- The flag MUST be set by both PCC and PCE in order to support the instantiation
The IFIT-ATTRIBUTES TLV provides the configurable knobs of the IFIT feature, and it can be included as an optional TLV in the LSPA object.

IFIT attribute TLVs, carried inside the LSPA object and applicable to all path types:
- IFIT TLVs are optional and can be taken into account by the PCE during path computation and by the PCC during path setup.
- In general, the LSPA object can be carried within a PCInitiate message, a PCUpd message, or a PCRpt message in the stateful PCE model.
IOAM Sub-TLVs

- IOAM Pre-allocated Trace Option Sub-TLV
  
  Type=1 | Length=8
  Namespace ID | Rsrd1
  IOAM Trace Type | Flags | Rsrd2

- IOAM Incremental Trace Option Sub-TLV
  
  Type=2 | Length=8
  Namespace ID | Rsrd1
  IOAM Trace Type | Flags | Rsrd2

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

- IOAM Edge-to-Edge Option Sub-TLV
  
  Type=4 | Length=4
  Namespace ID | IOAM E2E Type
Enhanced Alternate Marking Sub-TLV

- Enhanced Alternate Marking Sub-TLV

  +-------------------------------------------+-------------------------------------------+
  | Type=5                                    | Length=4                                 |
  +-------------------------------------------+-------------------------------------------+
  | FlowMonID                                 | Period | H | E | R |
  +-------------------------------------------+-------------------------------------------+

H: A flag indicating that the measurement is Hop-By-Hop.
E: A flag indicating that the measurement is end to end.
Discussion & Next Steps

• Since IFIT methods are becoming mature for SR-MPLS and SRv6, IFIT attributes TLV also complements draft-ietf-pce-segment-routing-policy-cp to enable SR policy with native IFIT.

• Ask for WG adoption

Welcome questions, comments

Thank you