

IETF 113 Path Computation Element (PCE) WG

Monday, March 21, 2022 (12:00-13:00 UTC)

Tuesday, March 22, 2022 (12:00-13:00 UTC)

Chairs

Julien Meuric (julien.meuric@orange.com)

Dhruv Dhody (dd@dhruvdhody.com)

Secretary

Hariharan Ananthakrishnan (hari@netflix.com)

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IETF 113 Vienna
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Definitive information is in the documents listed below and other IETF BCPs. For advice, please talk to WG chairs or ADs:

- [BCP 9](#) (Internet Standards Process)
- [BCP 25](#) (Working Group processes)
- [BCP 25](#) (Anti-Harassment Procedures)
- [BCP 54](#) (Code of Conduct)
- [BCP 78](#) (Copyright)
- [BCP 79](#) (Patents, Participation)
- <https://www.ietf.org/privacy-policy/>(Privacy Policy)

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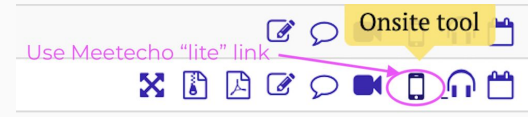
IETF 113 Meeting Tips

In-person participants

- Make sure to sign into the session using the Meetecho (usually the “lite” client) from the Datatracker agenda
- Use Meetecho to join the mic queue
- *Keep audio and video off if not using the onsite version*

Remote participants

- Make sure your audio and video are off unless you are chairing or presenting during a session
- Use of a headset is strongly recommended



Resources for IETF 113 Vienna

- Agenda
<https://datatracker.ietf.org/meeting/agenda>
- Meetecho and other information:
<https://www.ietf.org/how/meetings/113/preparation>
- If you need technical assistance, see the Reporting Issues page:
<http://www.ietf.org/how/meetings/issues/>

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- IETF participants extend respect and courtesy to their colleagues at all times.
- IETF participants have impersonal discussions.
- IETF participants devise solutions for the global Internet that meet the needs of diverse technical and operational environments.
- Individuals are prepared to contribute to the ongoing work of the group
- Please keep these in mind both at the mic and on Jabber/Meetecho
- See BCP 54!

Administrivia

- Both Chairs are remote, Secretary is on ground!
- Minute taker(s), jabber scribe(s)
- Meetecho Etiquette
 - Join the queue (onsite/remote) if you would like to speak/present
 - Do not send audio directly
 - Please state your name before speaking
 - Be mindful of the agenda time
 - Longer discussion on mailing list (or jabber)
- Collaborative minutes
 - <https://notes.ietf.org/notes-ietf-113-pce>

Usual Reminders

- Please use the mailing list actively!
- Please be more vocal during WG business (WG LC, adoption, etc)!
- Use the WG wiki to track progress -
<https://trac.ietf.org/trac/pce/wiki/WikiStart>
- Request for early code point allocation when you are planning to interop!

Agenda Bashing

PCE Working Group Meeting – Session I

12:00-13:00 UTC Monday March 21 Afternoon session

Introduction

- 1.1. Administrivia, Agenda Bashing (Chairs, 5 min) [5/60]
- 1.2. WG Status (Chairs, 10 min) [15/60]
- 1.3. State of WG I-Ds and next steps (Chairs, 10 min) [25/60]

Stateful

- 2.1 Local Protection Enforcement (Andrew Stone, 10 mins) [35/60]
[draft-ietf-pce-local-protection-enforcement-04](#)
- 2.2 SR-MPLS Entropy Label Position (Quan Xiong, 10 mins) [45/60]
[draft-peng-pce-entropy-label-position-07](#)
- 2.3 IFIT (Giuseppe Fioccola, 10 mins) [55/60]
[draft-chen-pce-pcep-ifit-06](#)

PCE Working Group Meeting – Session II

12:00-13:00 UTC Tuesday March 22 Afternoon session

Segment Routing

- 3.1 Circuit Style Policies (Samuel Sidor, 10 mins) [10/60]
[draft-sidor-pce-circuit-style-pcep-extensions-00](#)
- 3.2 Circuit Style Segment Routing Policies (Christian Schmutzer, 10 mins) [20/60]
[draft-schmutzer-pce-cs-sr-policy-01](#)

Others

- 4.1 VLAN-based Traffic Forwarding (, 10 mins) [30/60]
[draft-wang-pce-vlan-based-traffic-forwarding-05](#)
- 4.2 Multicast Tree Setup (Huanan Li, 10 mins) [40/60]
[draft-li-pce-multicast-00](#)
- 4.3 PCECC for BIER (Ran Chen, 10 mins) [50/60]
[draft-chen-pce-pcep-extension-pce-controller-bier-03](#)

WG Status

Beyond the WG

- One new RFCs since IETF 112
 - RFC 9168 (FlowSpec)
- RFC Editor Queue
 - None
- With the AD/IESG
 - draft-ietf-pce-binding-label-sid
 - Changes made based on IESG review
 - DISCUSS are cleared

In the WG's Hands

- Errata
 - SR MPLS - RFC 8664 - Technical (Verified)
 - By Shuping Peng
 - Incorrect value for F bit
 - Same issue was pointed out in SRv6 (fixed now)
- Early IANA codepoint allocation
 - draft-ietf-pce-segment-routing-ipv6
 - Expires 2023-01-12
 - draft-ietf-pce-local-protection-enforcement
 - Renewed!
 - Expires 2023-01-28
 - draft-ietf-pce-segment-routing-policy-cp
 - Renewed!
 - Expires 2023-03-30
 - draft-ietf-pce-binding-label-sid
 - Renewed!
 - Expires 2023-03-30

Status of WG I-Ds & Next Steps

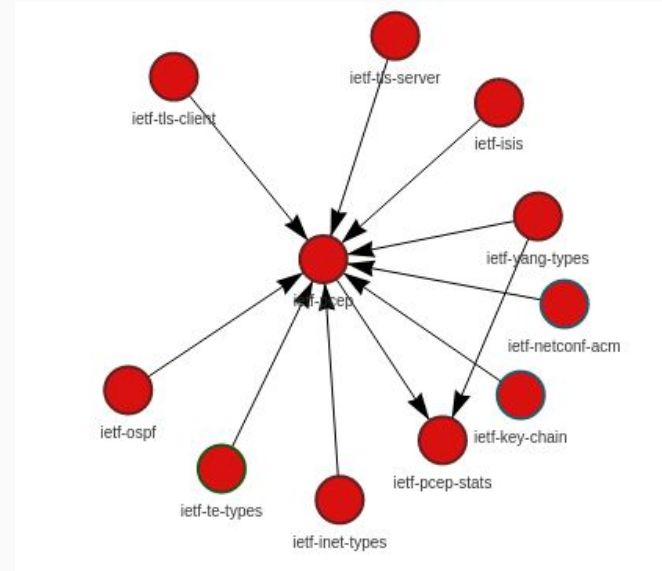
Post WG-LC

- **draft-ietf-pce-pcep-stateful-pce-gmpls**
 - Shepherd review done
 - Awaiting a document revision from authors
- **draft-ietf-pce-vn-association**
 - Comments received during WGLC
 - Awaiting a document revision from authors
 - Note the thread “ASCII in PCEP” in the mailing list

WG documents “nearing” WG LC

draft-ietf-pce-pcep-yang

- -18 posted on 2022-01-25
- Use of inet:ip-address-no-zone
- RPC statistics-reset is added
- Handled comments from
 - Tom Petch
 - Robert Varga
- YANG Doctor review is already requested



WG documents “nearing” WG LC

draft-ietf-pce-local-protection-enforcement

- -04 posted on 2022-01-30
- On the agenda!

draft-ietf-pce-segment-routing-ipv6

- -12 posted on 2022-03-06
- F bit error is fixed
- Description of SID Structure
- Order of the optional fields in the SRv6-ERO
- WGLC Next?

WG documents “nearing” WG LC

draft-ietf-pce-pcep-extension-native-ip

- -17 posted on 2022-02-06
- -18 posted on 2022-03-20
- Presented at IDR Interim
- Asked for comments on IDR list
 - Comments from Sue handled
 - Cross posting will be done for WG LC

draft-ietf-pce-flexible-grid

- -07 posted on 2022-03-07
 - No major technical change since a long time!
- Ready for WGLC

WG documents “nearing” WG LC

draft-ietf-pce-enhanced-errors

- -11 posted on 2022-03-07
 - No changes!
- No I-D currently using it
 - draft-ietf-pce-stateful-interdomain could!
- Is there still interest in this work?
- **Options:**
 - Progress this work as experimental
 - Would need reviewers to commit
 - Mark it as waiting for implementation
 - No feedback received

WG I-Ds

draft-ietf-pce-sr-path-segment

- -05 posted on 2022-02-13
- No technical change
- Align with changes for BSID
- Are there any other open issues?
- Nearing WG LC?

draft-ietf-pce-sr-bidir-path

- -09 posted on 2022-03-06
- No technical change
- Are there any open issues?
- Nearing WG LC?

WG I-Ds

draft-ietf-pce-segment-routing-policy-cp

- -06 posted on 2021-10-22
- No update since IETF 112

draft-ietf-pce-pcep-extension-pce-controller-sr

- -04 posted on 2022-03-06
- Minor updates

WG I-Ds

draft-ietf-pce-stateful-interdomain

- -03 posted on 2022-03-04
- Editorial changes only
- Question on using draft-ietf-pce-enhanced-errors

draft-ietf-pce-lsp-extended-flags

- -01 posted on 2021-10-18
- No recent changes
- Nearing WG LC?

WG I-Ds

draft-ietf-pce-multipath

- -04 posted on 2022-02-25
- Reverse Path Information added with I-flag (Informational) set
- Path ID = 0x0 reserved to indicate the absence of a Path ID
- Comments for 112
 - Add text about SR Bidirectional Association (it is mentioned only in example)

draft-ietf-pce-state-sync

- -01 posted on 2021-10-20
- No recent update

WG I-Ds

draft-ietf-pce-stateful-pce-option al

- -02 posted on 2021-10-23
- No recent update

draft-ietf-pce-sr-p2mp-policy

- -00 posted on 2021-12-08
- No update since adoption

Recently adopted documents

draft-ietf-pce-pcep-l2-flowspec

- -01 posted on 2022-03-06
- Aligned with RFC 9168 and FlowSpecv2

draft-ietf-pce-sid-algo

- -00 posted on 2022-02-22
- Comments received during WG adoption are pending

WG Adoption Poll Queue

- Refer
<https://trac.ietf.org/trac/pce/wiki/WikiStart#WGAdoptionCallQueue>
- draft-li-pce-pcep-pmtu
- draft-li-pce-pcep-srv6-yang
- draft-chen-pce-pcep-ifit
- draft-dhody-pce-pcep-extension-pce-controller-srv6
- ...

Thanks!

Backup!

Using the Mailing List

- Please use the mailing list actively to discuss all working group business
- Open issues with drafts should be discussed on the list, and conclusions reported to the list
- New drafts should be introduced to the working group first on the mailing list, to gauge interest
- Working group consensus is determined from the mailing list
- Priority in meetings is given to drafts that have been discussed on the list

Please be Vocal

- During WG Adoption and WG LC calls, response number is low.
- Please be vocal on the list to help us gauge the consensus better.
- The WG mailing lists are looked at by the IESG, IAB, and others (internal and external to IETF) to determine interest/participation level in our standards process.
- Please review ideas from your peers, these are community outputs of the working group as a whole.
- Also help flushing our queues faster
 - we had to extend the calls when response was lacking!

Using the Wiki

- A way to give you visibility as the document progress through the WG
 - adoption queue
 - WG LC queue
 - balancing work between chairs
 - shepherding responsibilities and opportunities
 - pending actions
 - IPR polls
- Use this wiki
 - make sure this is up to date!
- <https://trac.ietf.org/trac/pce/wiki/WikiStart>

Early Codepoint Allocation

- If you have an implementation of a WG I-D
 - that requires inter-operation with other implementations
 - Please request for early IANA codepoint allocation
 - Make sure to include an Implementation Status section in your I-D
 - Make sure the IANA section is correct and complete
 - And meets the condition set out in RFC 7120
- Maintained at
 - <https://trac.ietf.org/trac/pce/wiki/WikiStart#CandidateforearlyIANAAllocations>

Local Protection Enforcement in PCEP

draft-ietf-pce-local-protection-enforcement

IETF 113 – Hybrid

A. Stone – Nokia (andrew.stone@nokia.com) - Presenter

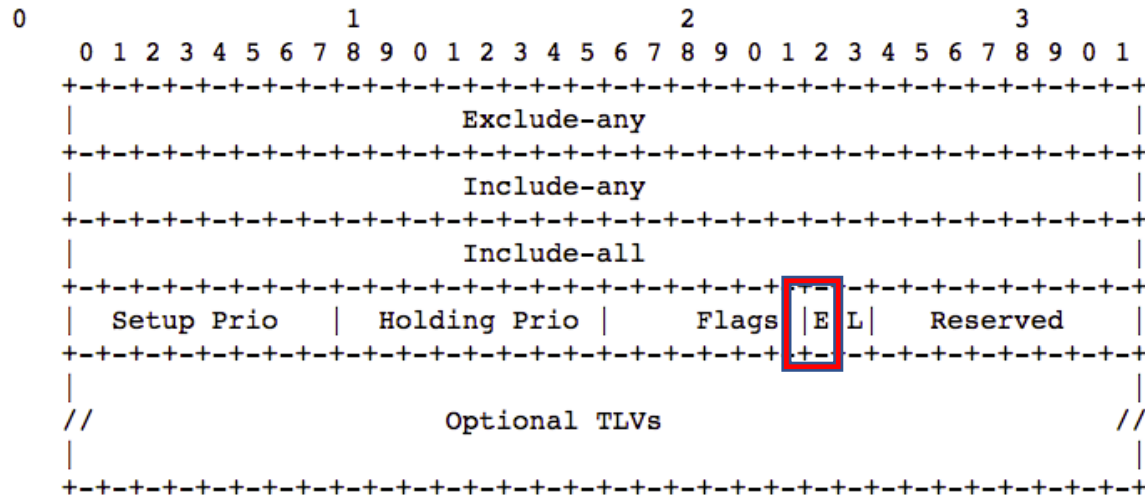
M. Aissaoui – Nokia (Mustapha.aissaoui@nokia.com)

S. Sivabalan – Ciena (ssivabal@ciena.com)

S. Sidor – Cisco (ssidor@cisco.com)

draft-ietf-pce-local-protection-enforcement

1. Wording and statements around the usage of existing Local Protection Desired Bit, while attempting to be *generally* backwards compatible with existing PCC and PCE implementations
2. New Flag: Enforcement (E-Flag) to accompany the L-Flag in the LSP Attributes object



Flags (8 bits)

- o L flag: As defined in [\[RFC5440\]](#) and further updated by this document. When set, protection is desired. When not set, protection is not desired. The enforcement of the protection is identified via the E-Flag.
- o E flag (Protection Enforcement): When set, the value of the L-Flag MUST be treated as a MUST constraint where applicable, when protection state of a SID is known. When E flag is not set, the value of the L-Flag MUST be treated as a MAY constraint.

Status

- -00 Uploaded Nov. 2019
- Presented IETF 106
- Presented IETF 108
- PCE WG Adopted Nov. 2020
- IANA early codepoint allocated Jan. 2021
 - Renewed Dec. 2021
- Implementations, various clarifications and editorial tweaks occurred
- Draft is stable

...Seeking working group last call

Outstanding

Generalize 'Enforcement'?

During adoption call, comments were raised regarding generalizing enforcement.

Required to do by this document?

- draft-dhody-pce-stateful-pce-optional covers generalized object enforcement
- Enforcing LSPA Object flags generically does not exist in PCEP. Idea proposed on list to follow like rfc5420(LSP_REQUIRED_ATTRIBUTES)
 - Currently there are remaining bits in LSPA, and this document is coupled to existing flag (L flag).
 - Seems unnecessary at current time, authors prefer to leverage existing available bit, as document and impl. are stable - seeking WG consensus.

Thanks!

PCEP Extension for SR-MPLS Entropy Label Position

draft-peng-pce-entropy-label-position-07

Quan Xiong(ZTE)
Shaofu Peng(ZTE)
Fengwei Qin(China Mobile)

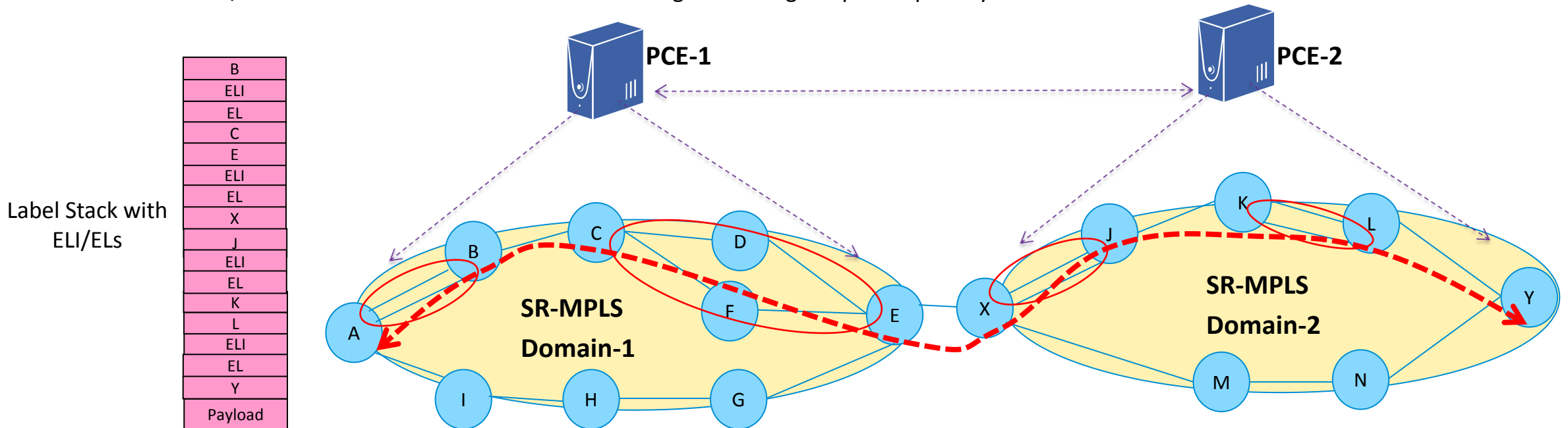
IETF 113 PCE, July 2022,

Updates from last versions

- Presented at IETF#106, #108 and #111 and comments on the mailing list are appreciated from :
 - Stephane Litkowski / Dhruv Dhody / Tarek Saad / Zhenbin Li / Jeff Tantsura/Cheng Li
- Updates before version -07
 - Move the E bit to LSP extended flags field in LSP-EXTENDED-FLAG TLV as per draft-ietf-pce-lsp-extended-flags
 - Clarification for the MSD and ERLD limitation and the requirements in PCE inter-domain scenario
 - Clarification for ingress capability and the E (ELP) bit is used to indicate the capability of inserting multiple ELI/EL pairs at PCC and support the SR path with ELP from PCE.
 - Clarification for the ELI/ELs positions calculated for a SR-Path
- Updates from version -07
 - Clarification for PCE to get MSD and ERLD capabilities and adding reference to existing underlying IGP extensions including IS-IS and OSPF
 - Clarification and remove the minimum-ERLD TLV
 - Synchronous update and consistent with the extension of BGP protocol

Overview

- RFC8662 proposes to apply the entropy labels to SR-MPLS networks and provides following criteria to determine the best ELI/ELs placement:
 - a limited number of <ELI, EL> pairs SHOULD be inserted in the SR-MPLS label stack;
 - the inserted positions SHOULD be within the Entropy Readable Label Depth (ERLD) of a maximize number of transit LSRs;
 - a minimum number of <ELI, EL> pairs SHOULD be inserted while satisfying the above criteria.
- As described in RFC8662, the ingress may not find the minimum ERLD along the path and does not support the computation of the minimum ERLD.
- The controller (e.g. PCE) MAY perform the end-to-end path computation as well as Entropy Label Position (ELP) including the number and the place of the ELI/ELs based on the minimum ERLD of each segment along the path especially in inter-domain scenarios.



PCEP Extensions

- The PCEs could get the information of all nodes such as MSD and ERLD through IGP and can compute the minimum ERLD along the end-to-end path.
 - The ERLD value can be collected via IS-IS [draft-ietf-isis-mpls-elic] and OSPF [draft-ietf-ospf-mpls-elic].
 - The MSD value can be collected via IS-IS [RFC8491] and OSPF [RFC8476].
- SR-PCE-CAPABILITY sub-TLV in Open Object
 - E bit is set to 1.
 - indicates that it supports the SR path computation with ELP configuration.
 - indicates that it supports the capability of inserting multiple ELI/EL pairs at PCC .

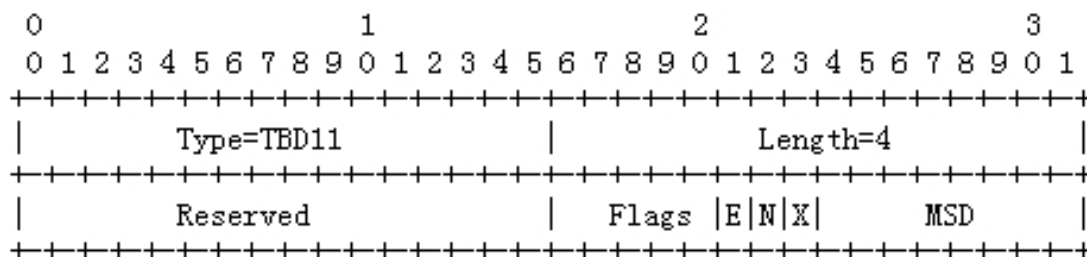


Figure 2: E-flag in SR-PCE-CAPABILITY sub-TLV

PCEP Extensions

- LSP-EXTENDED-FLAG TLV in LSP Object defined in draft-ietf-pce-lsp-extended-flags
 - E bit is set to 1.
 - indicates that the PCC requests PCE to compute the SR path with ELP information.

- SR-ERO Subobject
 - E bit is set to 1.
 - indicates that the position after this SR-ERO subobject is the position to insert <ELI, EL>, otherwise it cannot insert <ELI, EL> after this segment.

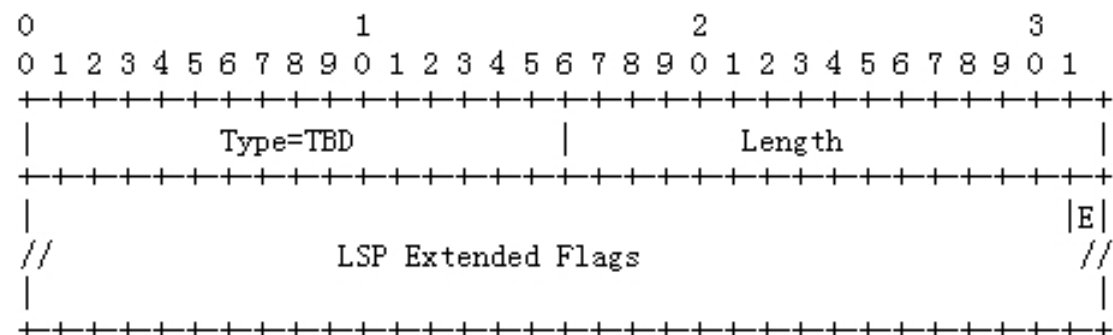


Figure 3: E-flag in LSP-EXTENDED-FLAG TLV

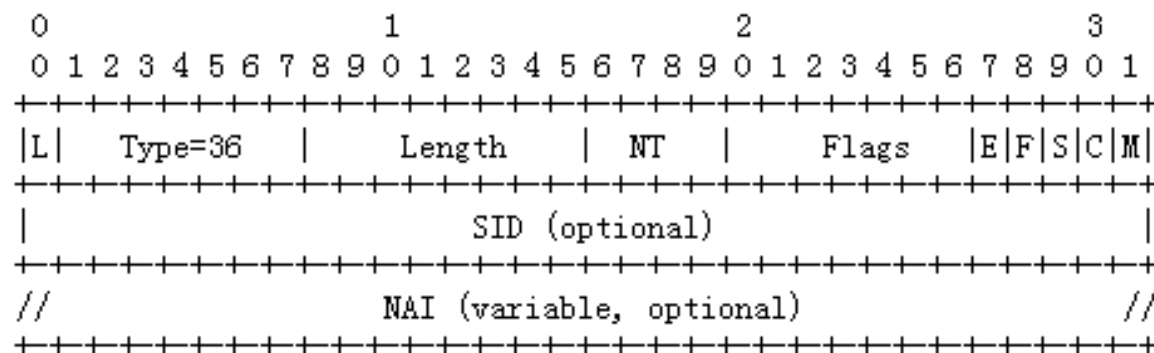


Figure 5: E-flag in SR-ERO subobject

Next Step

- This document has been discussed many times in details at the meetings and on the mailing list and all comments have been resolved .
- Thanks for all your comments and suggestions!
- Request for adoption!

Thank you!

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

draft-chen-pce-pcep-ifit-06

Hybrid, Mar 2022, IETF 113

Hang Yuan (UnionPay)
Tianran Zhou (Huawei)
Weidong Li (Huawei)
Giuseppe Fioccola (Huawei)
Yali Wang (Huawei)

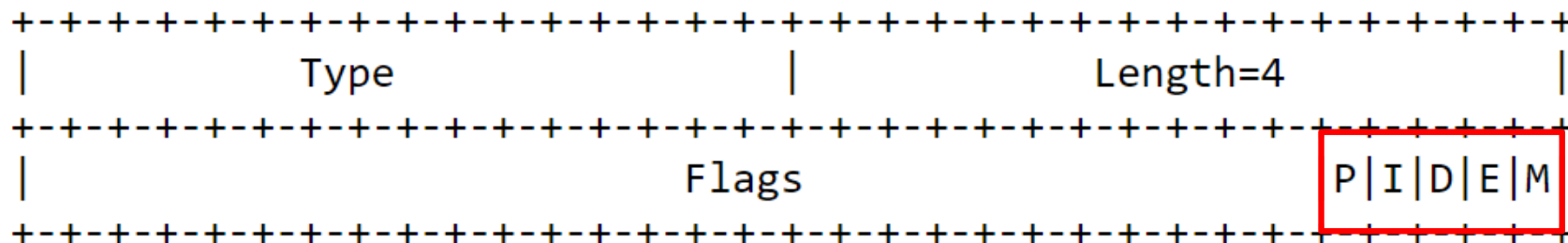
Background and Motivation

- ❑ 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

IFIT capability advertisement TLV

A new **IFIT-CAPABILITY TLV**, that is an optional TLV for use in the OPEN Object for IFIT attributes via PCEP capability advertisement

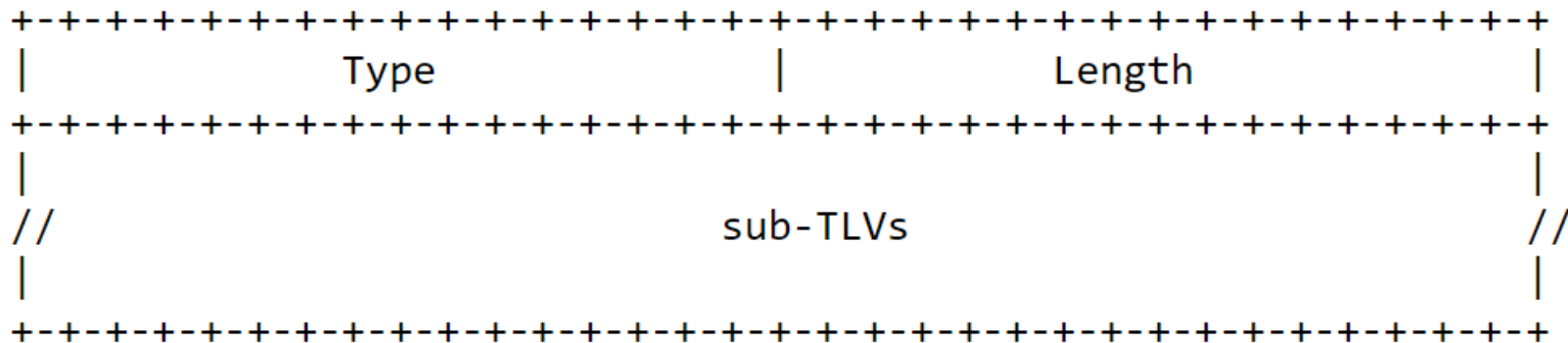


- P:** IOAM Pre-allocated Trace Option Type-enabled flag (draft-ietf-ippm-ioam-data)
- I:** IOAM Incremental Trace Option Type-enabled flag (draft-ietf-ippm-ioam-data)
- D:** IOAM DEX Option Type-enabled flag (draft-ietf-ippm-ioam-data)
- E:** IOAM E2E Option Type-enabled flag (draft-ietf-ippm-ioam-data)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

IFIT Attributes TLV

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 and AltMark Sub-TLVs

- IOAM Pre-allocated Trace Option Sub-TLV

| | | |
|-----------------|----------|-------|
| Type=1 | Length=8 | |
| Namespace ID | Rsvd1 | |
| IOAM Trace Type | Flags | Rsvd2 |

- Enhanced Alternate Marking Sub-TLV

| | | |
|-----------|----------|-------|
| Type=5 | Length=4 | |
| FlowMonID | Period | Flags |

- IOAM Incremental Trace Option Sub-TLV

| | | |
|-----------------|----------|-------|
| Type=2 | Length=8 | |
| Namespace ID | Rsvd1 | |
| IOAM Trace Type | Flags | Rsvd2 |

- 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 | |

Latest Changes

- Revised section on IANA Considerations
 - Added subsection on PCEP TLV Type Indicators
 - Added subsection on IFIT-CAPABILITY TLV Flags field
 - Added subsection on IFIT-ATTRIBUTES Sub-TLV
 - New subsection on Enhanced Alternate Marking Sub-TLV Flags field

- Flags: A 4-bits field. Two flags are currently assigned:

| Bit no. | Flag Name | Reference |
|---------|--------------------|---------------|
| 3 | H: Hop-By-Hop flag | This document |
| 2 | E: End-to-End flag | This document |
| 0-1 | Unassigned | |

- Added subsection on PCEP Error Codes

Discussion & Next Steps

- Relevant document to enable IFIT (IOAM and AltMark) control mechanisms
- 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