PCEP Procedures and Protocol Extensions for Using PCE as a PCECC of BIER

draft-chen-pce-pcep-extension-pce-controller-bier-03

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Introduction

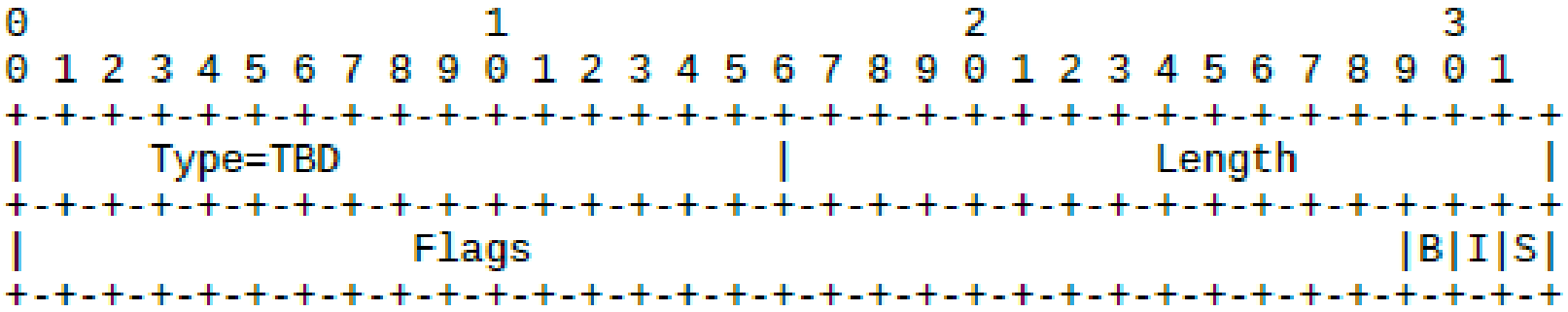
- This draft specify a new mechanism where PCE allocates the BIER information centrally and uses PCEP to distribute them to all nodes, then PCC generate a "Bit Index Forwarding Table"(BIFT).
- There are two ways to generate a "Bit Index Forwarding Table"(BIFT):
  - The PCECC allocate BIER parameters carried by CCI object, BIER Encapsulation TLV and FEC Object to the PCC. On receiving the BIER informations allocation, each node (PCC) uses IGP protocol to distribute BIER related information to other nodes. The node calculate the nexthop. In this case, Each node (PCC) only needs to be allocated its own BIER informations by the PCECC.
  - In scenarios where the IGP protocol is not used/available, Each node (PCC) is allocated its own and neighbor BIER informations by the PCECC, then PCC generates a BIFT based on the informations it receives.

Extensions

- BIER Capability Advertisement.
  - Defines a new Path Setup Type (PST) for BIER.
  - Adds B-bit in PCECC-CAPABILITY sub-TLV to exchange BIER capability.
- The SRP Object
  - Defines a new Path Setup Type (PST=TBD2) for BIER-TE.
- CCI Object
  - Defines a new CCI object-type for BIER
  - Defines/Reuses two optional TLV
    - Defines BIER Encapsulation Sub TLV to carry the BIER Encapsulation information.
    - Reuses ADDRESS TLV to carry the BFR outinterface and nexthop informations.
- FEC Object
  - Reuses FEC Object 1'IPv4 Node ID' and FEC Object-Type 2 'IPv6 Node ID‘ defined in [RFC8664] to carry the BFR prefix.

PCECC Capability sub-TLV

- [RFC9050] defined the PCECC-CAPABILITY TLV. A new B-bit is defined in PCECC-CAPABILITY sub-TLV for PCECC-BIER:



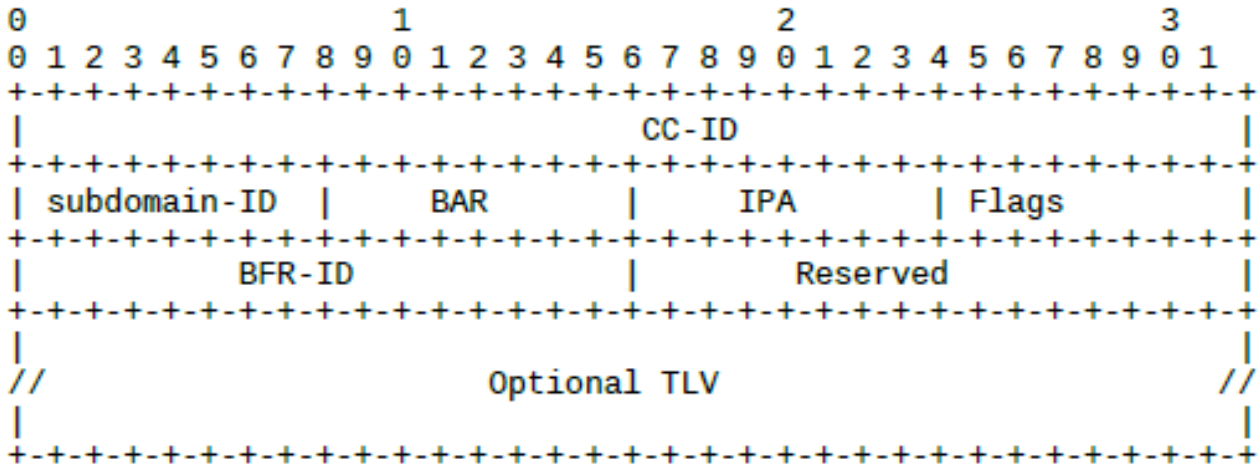
- B (PCECC-BIER-CAPABILITY - 1 bit): If set to 1 by a PCEP speaker, it indicates that the PCEP speaker is capable for PCECC-BIER capability and PCE would allocate BIER information on this session.

PATH-SETUP-TYPE TLV

- The PATH-SETUP-TYPE TLV is defined in [RFC8408]. PST = TBD is used when Path is setup via PCECC BIER mode. On a PCRpt/PCUpd/PCInitiate message, the PST=TBD indicates that this path was setup via a PCECCBIER based mechanism where either the BIER informations and BIER forwarding entries were allocated/instructed by PCE via PCECC mechanism.

CCI object

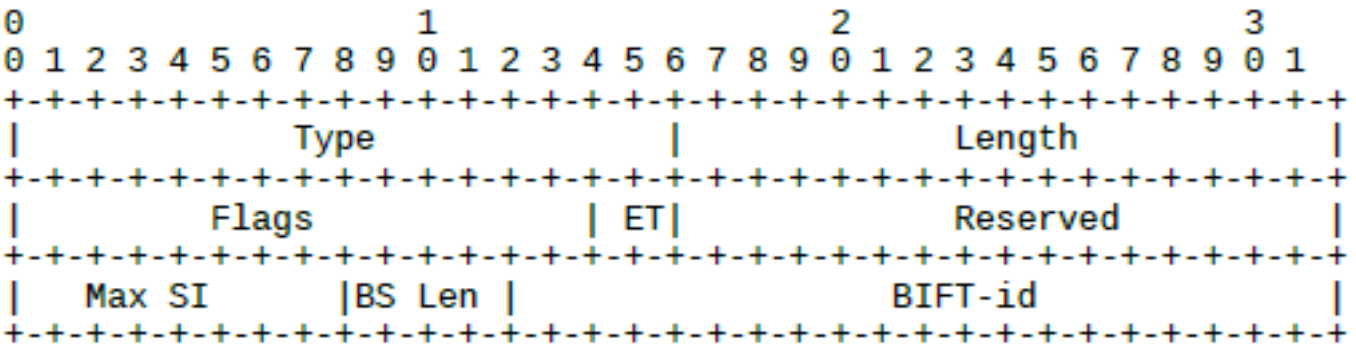
- Defines another object-type for BIER purpose.



- BIER subdomain-ID: Unique value identifying the BIER subdomain. (as defined in [RFC8401].
- BAR(BIER Algorithm) and IPA(IGP Algorithm), as documented in [RFC8401].
- BFR-ID: A 2-octet field encoding the BFR-id, as documented in [RFC8279].
- Optional TLV: There are two optional TLV are defined/reused in this draft.

Optional TLV

- BIER Encapsulation Sub TLV:



  - ET-Flag: Encapsulation type Flag, There are two Encapsulation Types:

    * 0b00-MPLS encapsulation.

    * 0b01-Non-MPLS encapsulation.
  - Max SI: A 1 octet field encoding the Maximum Set Identifier(Section 1 of [RFC8279]) used in the encapsulation for this BIER subdomain for this BitString length.
  - Local BitString Length (BS Len): Encoded BitString length as per [RFC8296].
  - BIFT-id: A 20 bit field encoding the first BIFT-id of the BIFT-id range.

Optional TLV (Cont.)

- Address TLVs
  - Address TLVs described in [RFC9050] are used to associate the nexthop information, so we Reuse ADDRESS TLV to carry the BFR outinterface and nexthop informations.

FEC Object

- BIER information is always associated with a host prefix, so we reuse FEC Object 1'IPv4 Node ID' and FEC Object-Type 2 'IPv6 Node ID‘ defined in [RFC8664] to carry the BFR prefix.

Next Steps

- Comments welcome.

Thanks!