# PCE for BIER-TE Ingress Protection

draft-chen-pce-bier-te-ingress-protect-00

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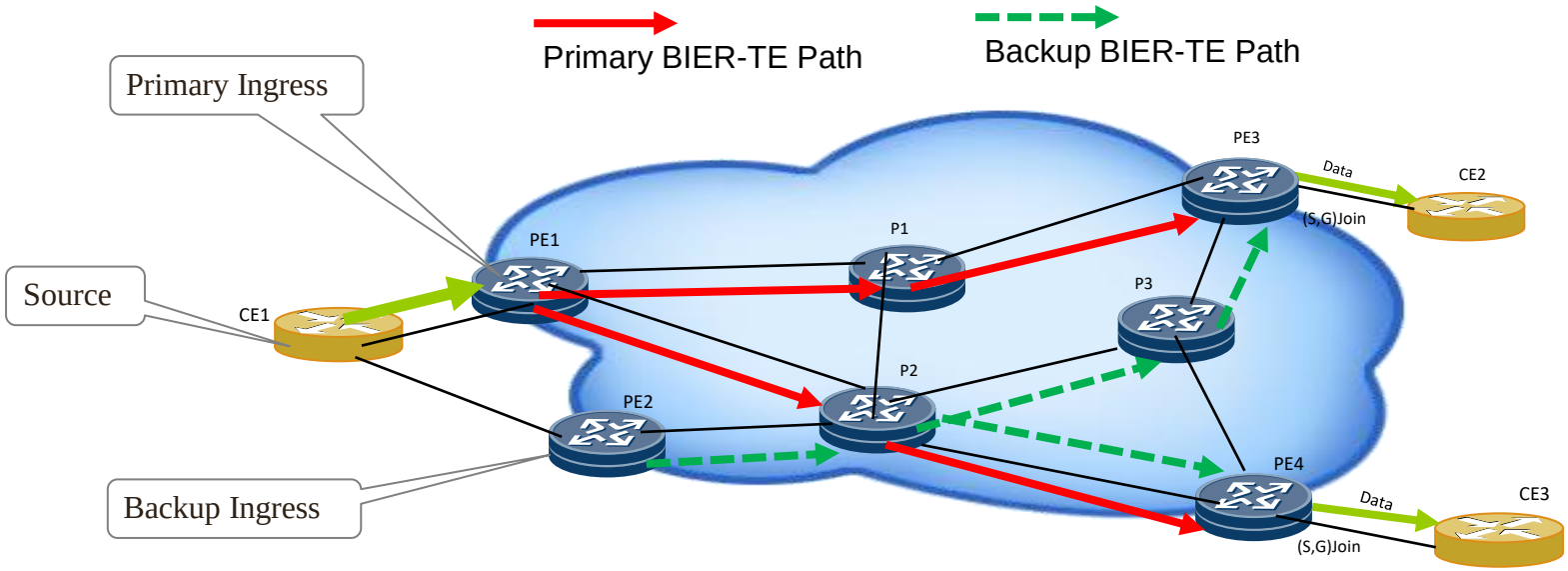
IETF 111

# BIER-TE Ingress Protection Overview




In Normal Operations

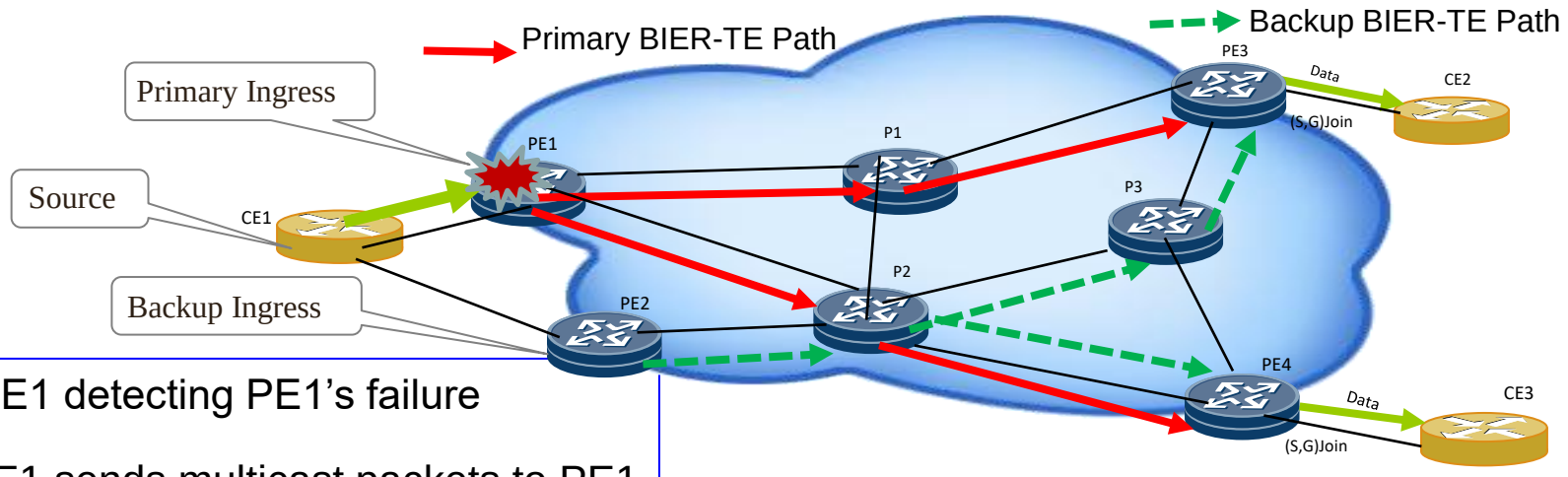
1. CE1 sends multicast packets to primary ingress PE1
2. PE1 encapsulates the packets with BIER-TE header encoding primary path from PE1 to PE3 and PE4

When PE1 fails

1. CE1 sends multicast packets to backup ingress PE2
2. PE2 encapsulates the packets with BIER-TE header encoding backup path from PE2 to PE3 and PE4

To support ingress protection,
PCE sends information to backup ingress: backup BIER-TE path + others

# Behavior around Ingress Failure




**A.** Source CE1 detecting PE1's failure

Before failure:

1. CE1 sends multicast packets to PE1
2. PE2 is ready to encapsulate packets with backup path

After CE1 detects failure,

1. CE1 sends multicast packets to PE2
2. (PE2 encapsulates packets with backup path)

**B.** Backup Ingress PE2 detecting PE1's failure

Before failure:

1. CE1 sends multicast packets to both PE1 and PE2
2. PE2 drops the packets

After PE2 detects failure,

1. (CE1 sends multicast packets to PE2)
2. PE2 encapsulates packets with backup path

**C.** Both CE1 and PE2 detecting PE1's failure

Before failure:

1. CE1 sends multicast packets to PE1
2. PE2 drops packets

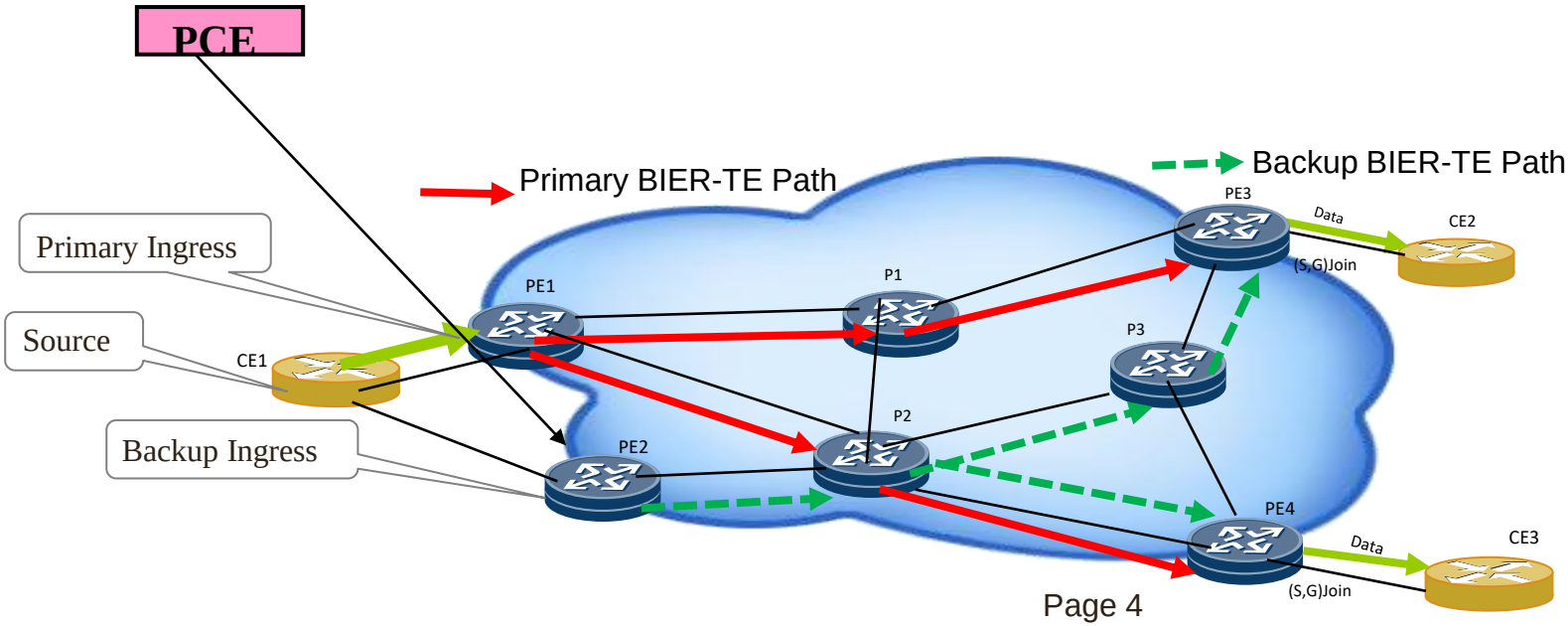
After CE1 and PE2 detect failure,

1. CE1 sends multicast packets to PE2
2. PE2 encapsulates packets with backup path

PCE sends PCC on PE2:
backup path + PE1's Address + others
PCE sends PCC on CE1:
instructions

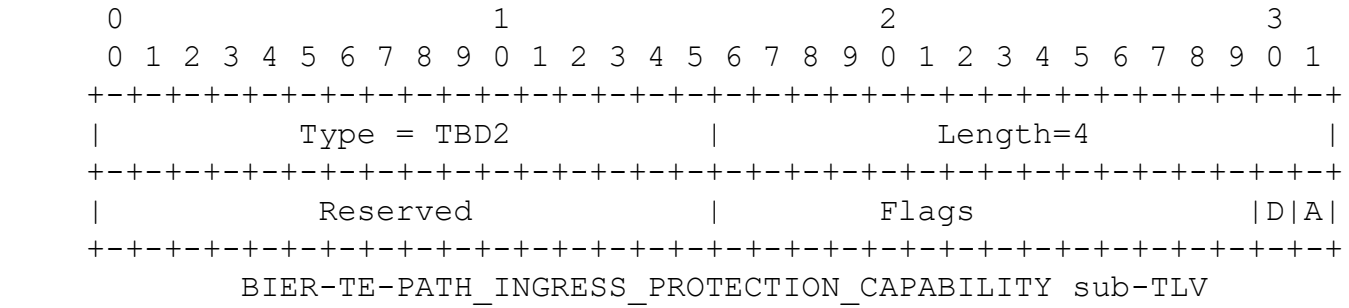
# Information sent to Backup Ingress by PCE

- **Backup BIER-TE Path** (can be encoded in the same way as primary path)
- **Primary Ingress** Address if backup ingress detects failure of primary ingress
- **Description of Traffic** carried by BIER-TE path
- **Service** Label/ID carried by BIER-TE path



# Capability for BIER-TE Path Ingress Protection

PCC on backup ingress and PCE exchange capabilities of protecting ingress of BIER-TE path
Sub-TLV below is included in the PATH_SETUP_TYPE_CAPABILITY TLV with PST = TBD1 in Open




BIER-TE-PATH_INGRESS_PROTECTION_CAPABILITY sub-TLV

- D flag: A PCC sets this flag to 1 to indicate that it is able to detect its adjacent node's failure quickly
- A flag: A PCE sets this flag to 1 to request a PCC to let the forwarding entry for the backup BIER-TE path be Active.

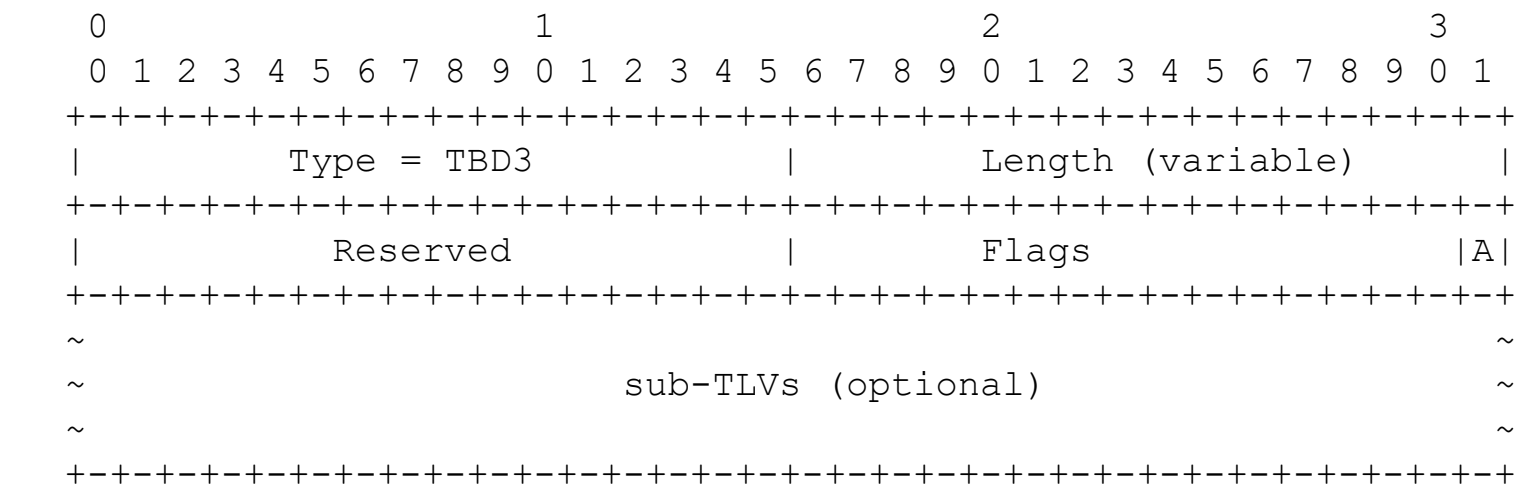
PCC on source and PCE exchange capabilities of supporting protection for ingress of BIER-TE path
PCECC-CAPABILITY Sub-TLV included in the PATH_SETUP_TYPE_CAPABILITY TLV in Open

A new flag bit P is defined in the Flags field of the PCECC-CAPABILITY sub-TLV

- P flag (for Ingress Protection): if set to 1 by a PCEP speaker, the P flag indicates that the PCEP speaker supports and is willing to handle the PCECC based central controller instructions for ingress protection. The bit MUST be set to 1 by both a PCC and a PCE for the PCECC ingress protection instruction download/report on a PCEP session.

# BIER-TE Path Ingress Protection TLV for Backup Ingress

- BIER-TE-PATH_INGRESS_PROTECTION TLV is defined below
- When PCE sends PCC on backup ingress a PCInitiate for initiating a backup BIER-TE path to protect ingress of Primary BIER-TE path, containing it




BIER-TE-PATH_INGRESS_PROTECTION TLV

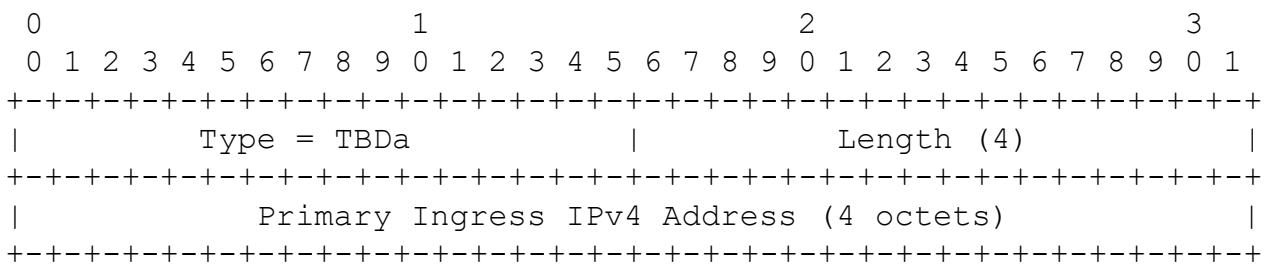
o A flag: A PCE sets this flag to 1 to request a PCC to let the forwarding entry for the backup BIER-TE path be Active.

Two optional sub-TLVs are defined

1. Primary-Ingress sub-TLV
2. Service sub-TLV

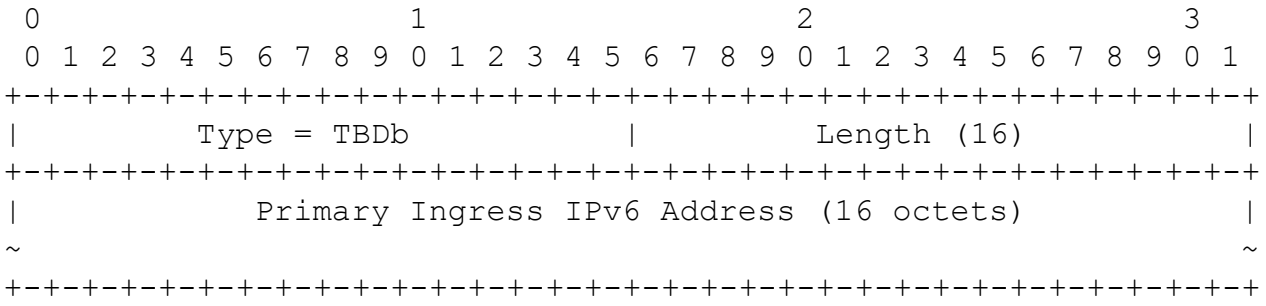
# Primary Ingress IPv4/6 Address Sub-TLV

Primary-Ingress IPv4 sub-TLV indicates the IPv4 address of the primary ingress of a BIER-TE path




Primary Ingress IPv4 Address sub-TLV

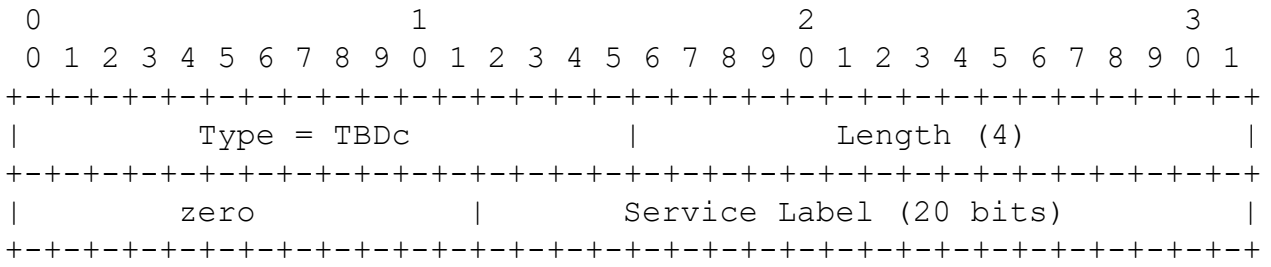
Primary-Ingress IPv6 sub-TLV indicates the IPv6 address of the primary ingress of a BIER-TE path.



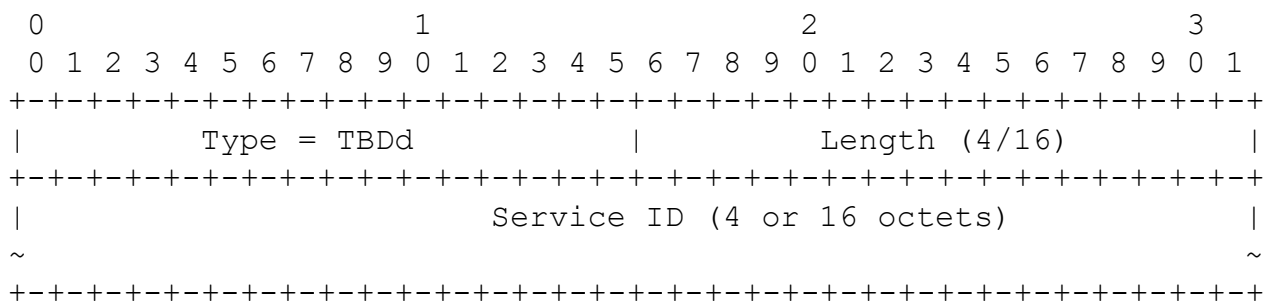

Primary Ingress IPv6 Address sub-TLV

# Service Sub-TLVs

A Service sub-TLV contains a service ID or label to be added into a packet to be carried by a BIER-TE path. It has two formats: one for the service identified by a label and the other for the service identified by a service identifier (ID) of 32 or 128 bits.



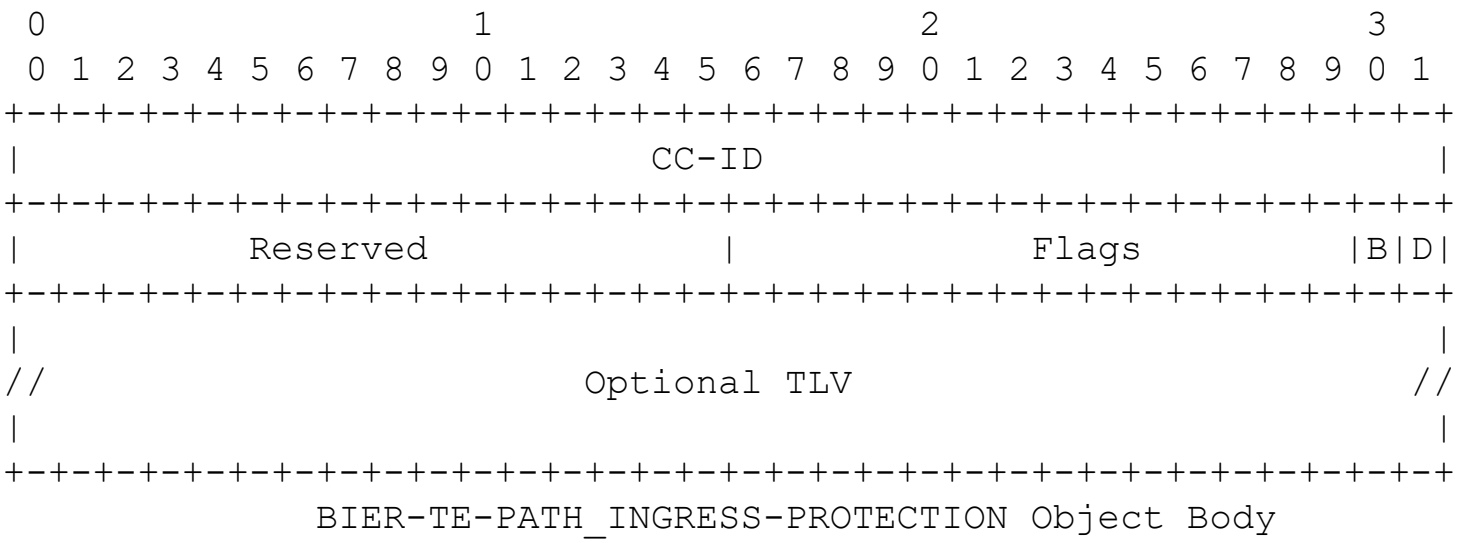

Service Label sub-TLV




Service ID sub-TLV

# BIER-TE Path Ingress Protection Object for Source

- a new object-type (TBDt) for BIER-TE ingress protection based on CCI object
- The body of the object with the new object-type is illustrated below. The object may be in PCRpt, PCUpd, or PCInitiate message.




BIER-TE-PATH_INGRESS-PROTECTION Object Body

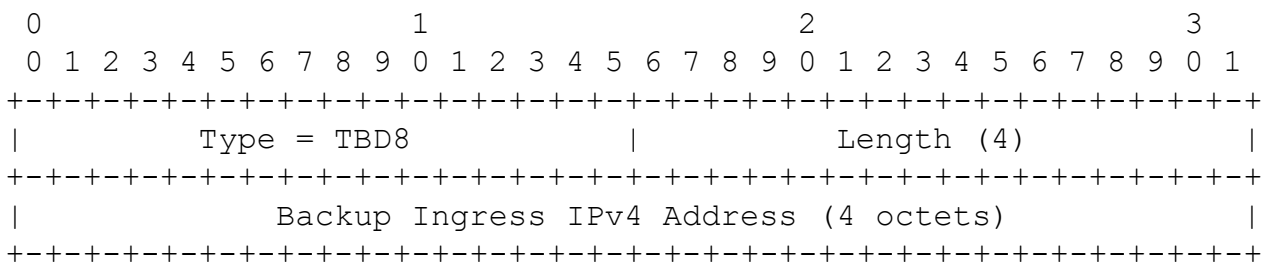
Flags: Two flag bits D and B are defined as follows:

- D: D = 1 instructs the PCC of the traffic source to Detect the failure of the primary ingress and switch the traffic to the backup ingress when it detects the failure.
- B: B = 1 instructs the PCC of the traffic source to send the traffic to Both the primary ingress and the backup ingress.

Optional TLV: Primary ingress TLV, backup ingress TLV and/or Multicast Flow Specification TLV.

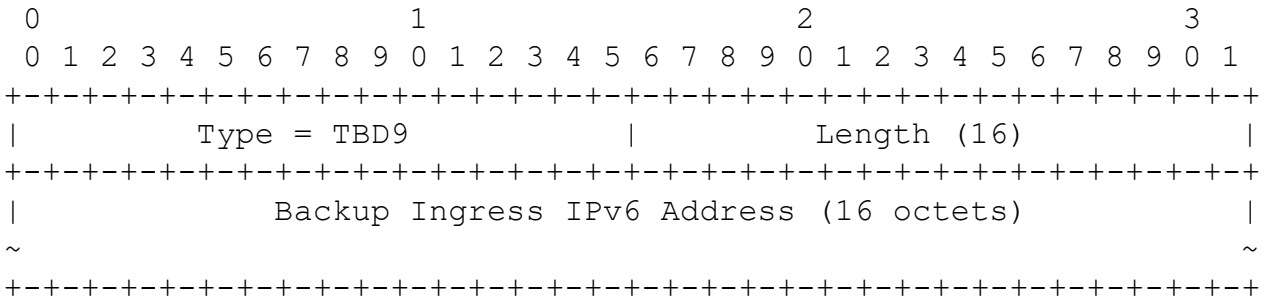
# Backup Ingress IPv4/6 Address TLV

Backup-Ingress IPv4 TLV indicates the IPv4 address of the backup ingress of a BIER-TE path




Backup Ingress IPv4 Address TLV

Backup-Ingress IPv6 TLV indicates the IPv6 address of the backup ingress of a BIER-TE path.




Backup Ingress IPv6 Address TLV

# Next Step

Comments