BIER-TE Egress Protection

draft-chen-bier-te-egress-protect-00

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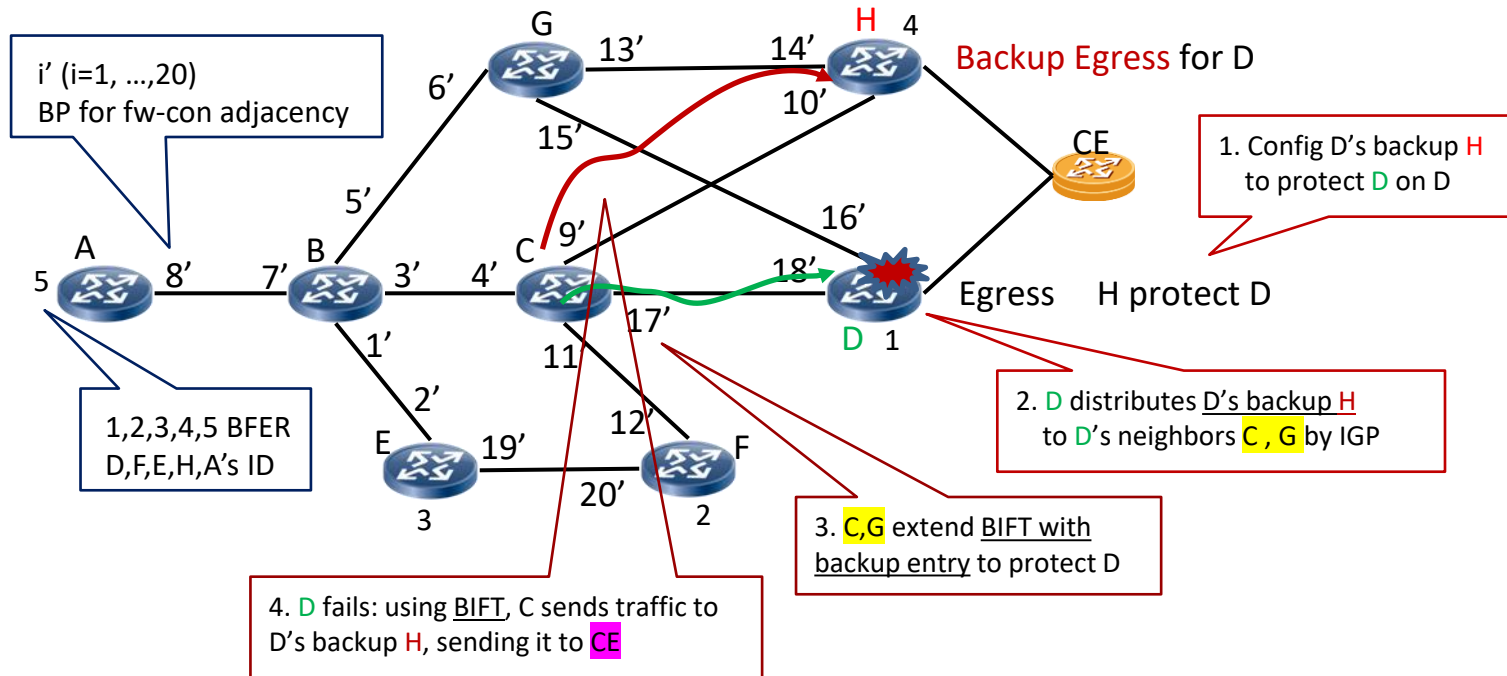
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IETF 110

Introduction

BIER-TE Egress Protection (EP)

- Fast protection for egresses in BIER-TE domain

- No per-flow state in the core

BIER-TE EP Overview

BIER-TE Egress Protection (EP) Idea

1. Configure backup egress to protect an egress (e.g., H is configured to protect D on D)

2. Egress distributes its backup to its neighbors (e.g., D distributes "H backup D" to C and G)

3. Neighbors extend their BIFTs to protect egress
    (e.g., C extends its BIFT to protect D, G extends its BIFT to protect D),

4. Egress fails, forwards packets to backup egress, sending packets to CE receiver.

Extended BIFT for EP

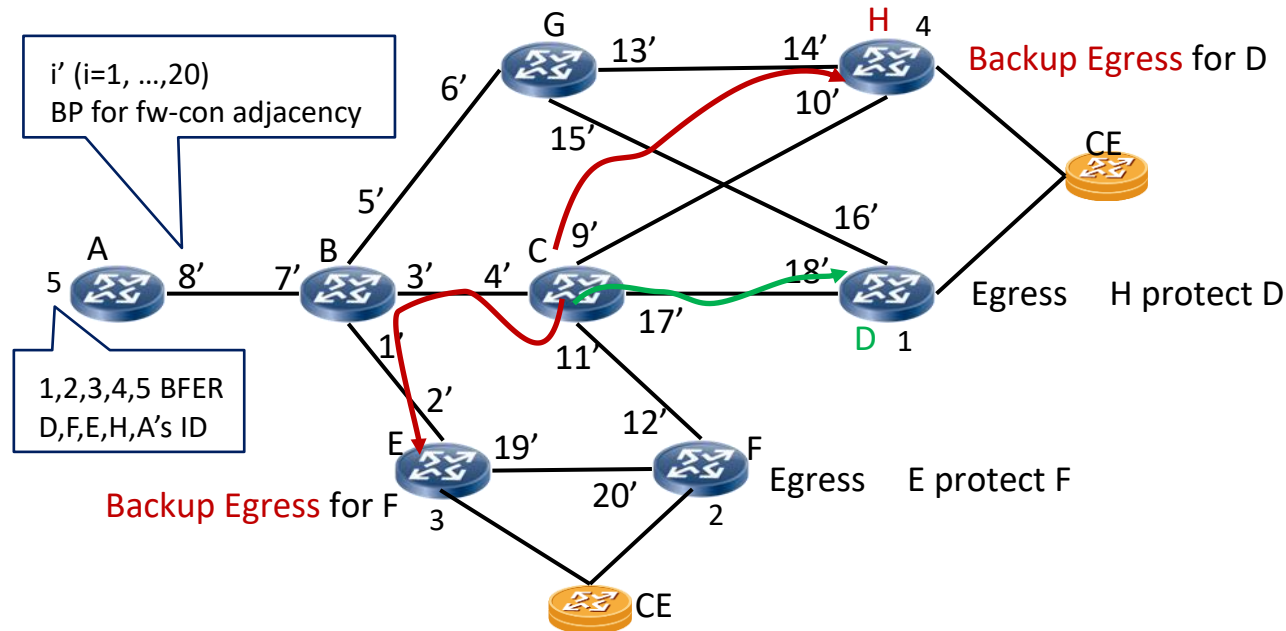Extended BIFT on BFR X has a backup entry for each egress connected to X

BIFT on C

BFR-id (SI:Bitstring)	Action	BFR-NBR (Next Hop)	Backup Entry (EPA,BackupPath)
18' (9:00100)	fw-connected	D	EPA=0, C→H:{10', 4}
12' (8:00010)	fw-connected	F	EPA=0, C→E:{3',2',3},
0' (7:10000)	fw-connected	H	EPA=0, C→D:{18',1}
3' (6:00100)	fw-connected	B	EPA=0,{} B is not BFER

Backup Path to Backup egress H

Normal: forwards packet using normal BIFT

Ex BIFT for EP

i' (i=1, …,20) BP for fw-con adjacency

1,2,3,4,5 BFER D,F,E,H,A's ID

Backup Egress for D

H protect D

Egress   H protect D

Backup Egress for F

Egress   E protect F

Example BIER-TE EP

Path A to D, F: {7', 4', 18', 12', 2, 1}

Packet with path in normal operations

{4',18',12',2,1}Pkt

{18',12',2,1}Pkt

Backup Egress for D

H protect D

Egress

{2,1}Pkt

Backup Egress for F

Egress   E protect F

{2,1}Pkt

Packet with path when BFER D fails

{10',2,4}Pkt

{18',12',2,1}Pkt

{4',18',12',2,1}Pkt

Backup Egress for D

{2,4}Pkt

H protect D

Egress

Backup Egress for F

Egress   E protect F

{2,1}Pkt
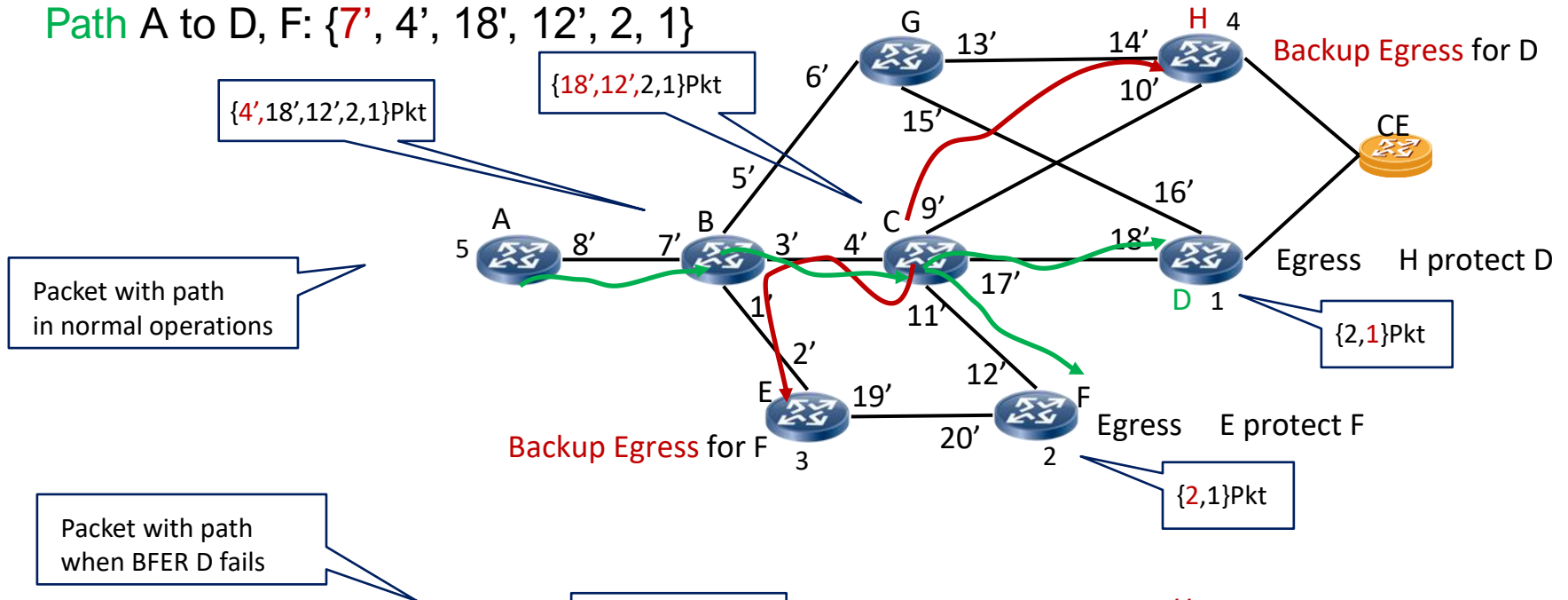
18'	BFR-NBR (Next Hop)	Backup Entry (EPA,BackupPath)
	D	EPA=1, C→H:{10',4},

Updated Forwarding Procedure (1)

For BFR-NBR N as egress encoded in a packet,

EPA == 1? (N fails and protected?)

If so, clears BP for adjacency to N and BP for BFER N,

      If BP for N's backup egress B == 0,

            copies and sends the packet to B along backup path.

Adds BPs for backup path into BitString

Updated Forwarding Procedure (2)

```
Packet = the packet received by BFR;
FOR each BP k (from the rightmost in Packet's BitString) {
    IF (BP k is local decap adjacency) {
        copies Packet, sends the copy to the multicast
        flow overlay and clears bit k in Packet's BitString
    } ELSE IF (BP k is forward connect adjacency of the BFR) {
        finds the forwarding entry in the BIER-TE BIFT for the domain
        using BP k
        IF (EPA == 1) {//Egress Protection for BFR-NBR/egress is Active
            Clears BP k and BP for BFR-NBR in Packet's BitString
            IF (BP for backup egress is 0 in Packet's BitString) {
                Adds BPs for backup path into Packet's BitString;}
        } //egress removed, backup path to backup egress added
        ELSE {
            Copies Packet, updates the copy's BitString by
            clearing all the BPs for the adjacencies of the BFR,
            and sends the updated copy to BFR-NBR
        }
    }
}
```

When egress N fails, if it is protected (EPA==1), then packet to N is not sent to N, but
to N's backup egress B along backup path if BP for B is 0.

Next Steps

- Welcome comments