

SR-MPLS FRR Extension

draft-chen-spring-srmpls-frr-ex-03

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IETF 118

Overview

Thank people below for their comments and suggestions

- Joel Halpern
- Andrew Stone
- Yao Liu
- Jeff Tantsura

Updates to previous versions

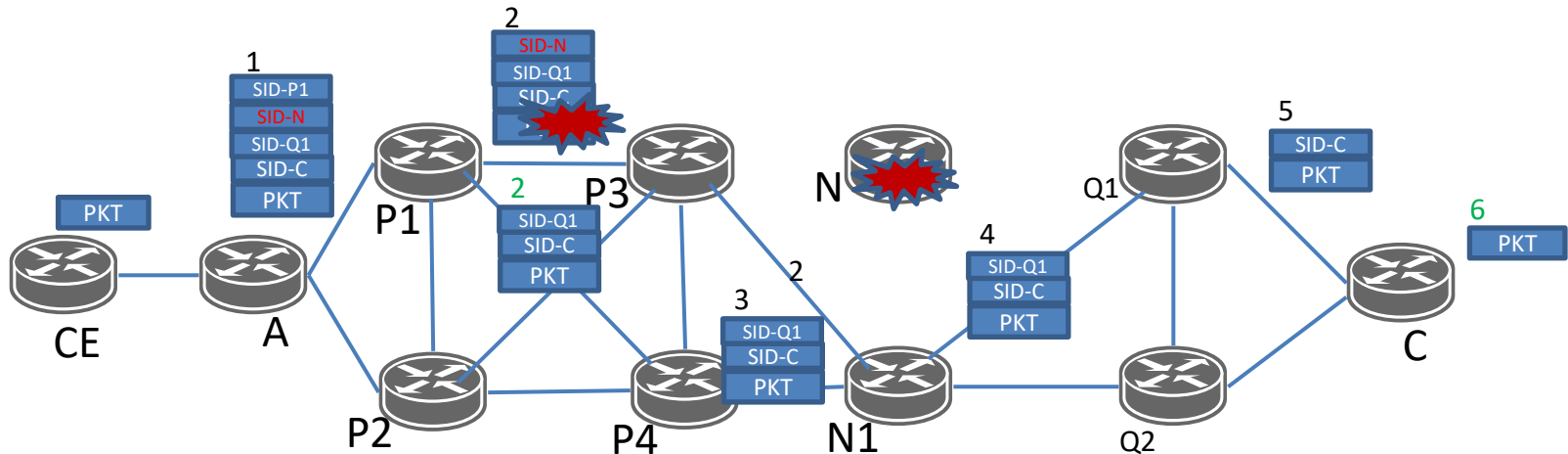
- Added description on how to determine whether a SID is a failed SID
- Added references
- Some Editorial Changes

Is SID a Failed SID?

The first (closest) upstream endpoint **P1** of **N** determines whether SID is a failed SID:

IF there is a RIB/FIB entry for SID (e.g., **SID-N**) and then the entry for SID is to be removed after SPF

THEN SID is a failed SID



N failed after IGP converges: Packet (Pkt) dropped at P1 since SID-N is a failed SID (no route to SID-N)

FRR extension:

2. P1 **pops SID-N, sends** packet to P4 **using FIB for SID-Q1** (along shortest path to Q1/SID-Q1),

Next Steps

- Welcome comments
- Adoption

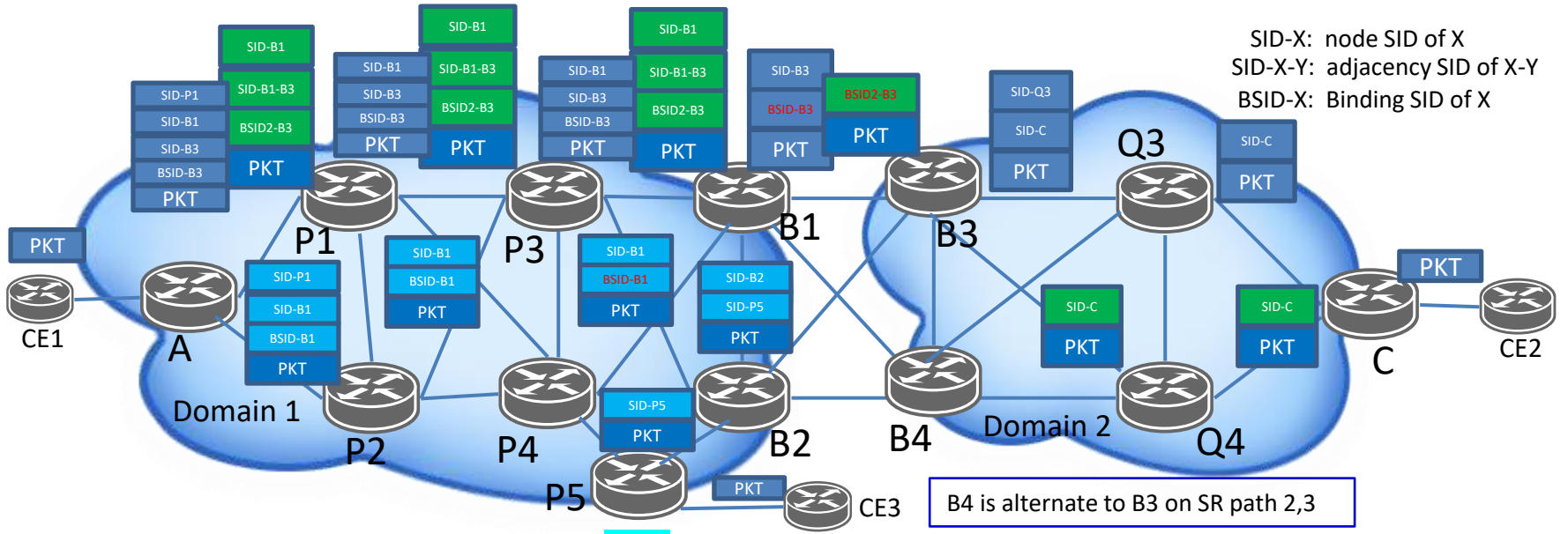
SR Path Binding Protection Architecture

draft-chen-spring-sr-bind-protect-arch-00

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SID-list a, c, b for BSID of node on SR path



SR path 1: A->P1->B1->BSID-B1 (->B2->P5), BSID-B1: with list a={SID-B2, SID-P5}
 SID-P1, SID-B1, BSID-B1 Single Domain B1: loose hop, P1: endpoint

SR path 2: A->P1->B1->B3->BSID-B3 (->Q3->C), BSID-B3: with list a={SID-Q3, SID-C}
 SID-P1, SID-B1, SID-B3, BSID-B3 Two Domains B3: loose hop, B1: endpoint

SR path 3: A->B1->B3->BSID2-B3 (->Q3->C), BSID2-B3: with list a={SID-B3-Q4, SID-C}
 SID-B1, SID-B1-B3, BSID2-B3 Two Domains B3: strict hop

SID-list a (active), representing active path segment for BSID

c=a if 1st SID in a is node SID

c=a

1st SID in a is adjacency SID: node SID of remote

SID-list c (corresponding to a), representing corresponding (backup) path segment. E.g.,
 BSID-B1 on path 1, SID-list c={SID-B2, SID-P5}; BSID-B3 on path 2, SID-list c={SID-Q3, SID-C};
 BSID2-B3 on path 3, SID-list c={SID-Q4, SID-C}

b=c if Single domain

b = SID-B4 + c if OAD (One SP Administrates 2 Domains)

b = SIB-B4 + c if OAD

SID-list b, representing backup path for the failure of the node. E.g.,

BSID-B1 on path 1, SID-list b={SID-B2, SID-P5}; BSID-B3 on path 2, SID-list b={SID-B4, SID-Q3, SID-C}; BSID2-B3 on path 3, SID-list b={SID-B4, SID-Q4, SID-C}

TAD(Two SP Administrate 2 Domains): BSID-B3 on path 2, SID-list b={SID-B4, BSID-B4};

BSID2-B3 on path 3, SID-list b={SID-B4, BSID2-B4}

BSID-B4 with SID-list c

BSID2-B4 with SID-list c

Binding Protection Information Distribution

Node N on an SR path has

- BSID-N: A Binding SID of N, associated with
- SID-list a

E.g., B1 on path 1 has BSID-B1 with SID-list a = {SID-B2, SID-P5}; B3 on path 2 has BSID-B3 with SID-list a = {SID-Q3, SID-C}

➤ Single domain:

- BSID-N, SID-list b (=SID-list c) and ID-N is sent to upstream neighbor of N on path
 - It is sent to the first (closest to) upstream endpoint of N on path if N is loose hop on path
- E.g., for B1 on path 1, BSID-B1, SID-list b = {SID-B2, SID-P5} and ID-B1 is sent to P3 and P1.

➤ OAD (One SP Administrates 2 Domains):

- BSID-N, SID-list b = SID-aN + SID-list c and ID-N is sent to upstream neighbor of N on path
 - It is sent to the first (closest to) upstream endpoint of N on path if N is loose hop on path
- E.g., for B3 on path 2, BSID-B3, SID-list b = {SID-B4, SID-Q3, SID-C} and ID-B3 is sent to B1.
for B3 on path 3, BSID2-B3, SID-list b = {SID-B4, SID-Q4, SID-C} and ID-B3 is sent to B1.

➤ TAD (Two SP Administrate 2 Domains):

1) First piece of binding protection information

- BSID-aN with SID-list c is sent to alternate node aN

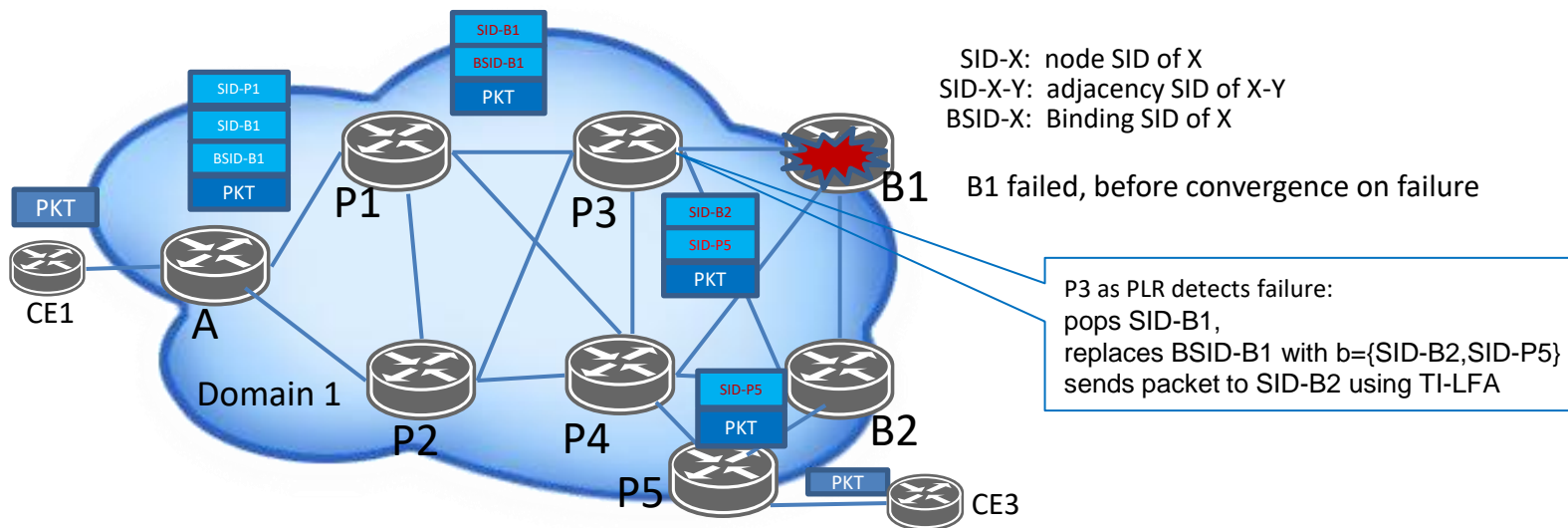
E.g., for B3 on path 2, BSID-B4 with SID-list c = {SID-Q3, SID-C} is sent to alternate border node B4
for B3 on path 3, BSID2-B4 with SID-list c = {SID-Q4, SID-C} is sent to alternate border node B4

2) Second piece of binding protection information

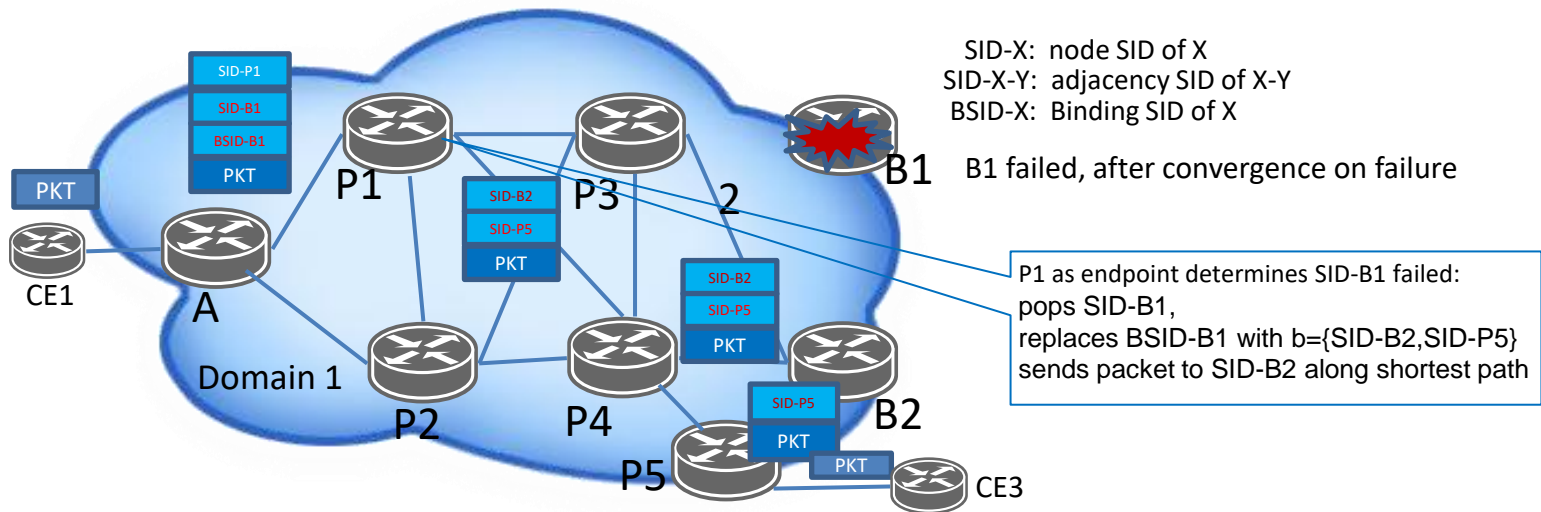
- BSID-N, SID-list b = {SID-aN, BSID-aN} and ID-N is sent to upstream neighbor of N on path
- It is sent to the first (closest to) upstream endpoint of N on path if N is loose hop on path

E.g., for B3 on path 2, BSID-B3, SID-list b = {SID-B4, BSID-B4} and ID-B3 is sent to B1.
for B3 on path 3, BSID2-B3, SID-list b = {SID-B4, BSID2-B4} and ID-B3 is sent to B1.

Single Domain: B1 with BSID-B1 on SR path 1 failed

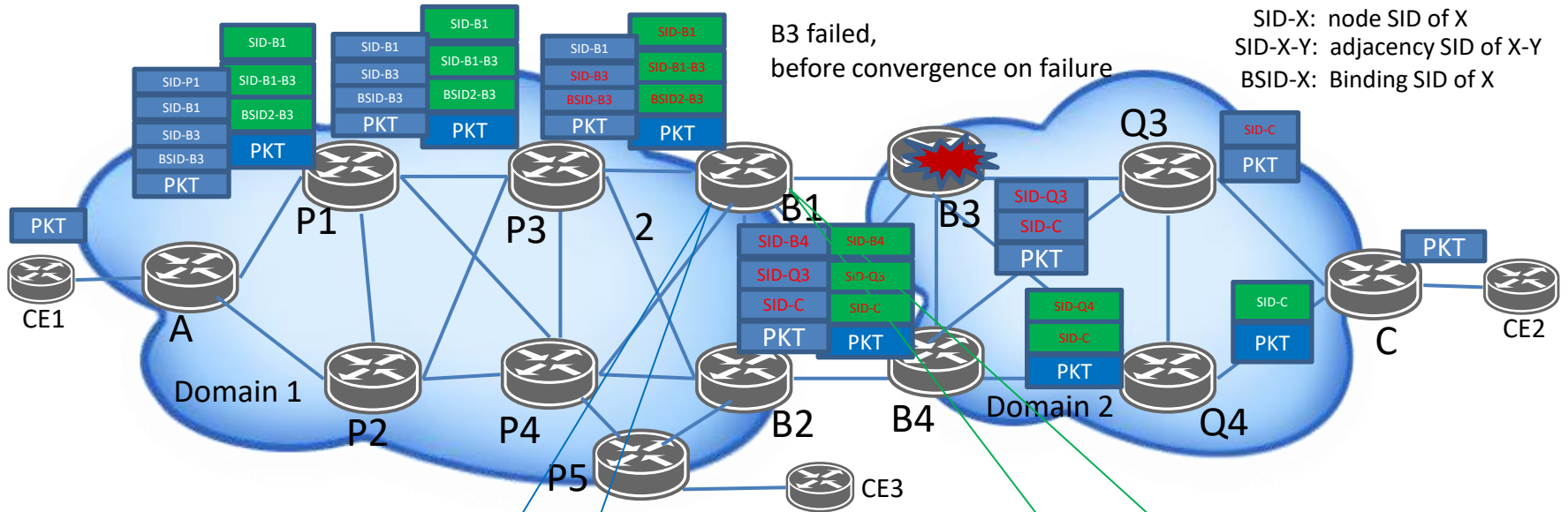


SR path 1: A->P1->B1-->BSID-B1 (->B2->P5), BSID-B1: with list a={SID-B2, SID-P5}
 SID-P1, SID-B1, BSID-B1 Single Domain list b={SID-B2, SID-P5}



SR path 1: A->P1->B1-->BSID-B1 (->B2->P5), BSID-B1: with list a={SID-B2, SID-P5}
 SID-P1, SID-B1, BSID-B1 Single Domain list b={SID-B2, SID-P5}

OAD: B3 with BSID-B3 on SR path 2, with BSID2-B3 on SR path 3 failed



B3 failed,
before convergence on failure

SID-X: node SID of X
SID-X-Y: adjacency SID of X-Y
BSID-X: Binding SID of X

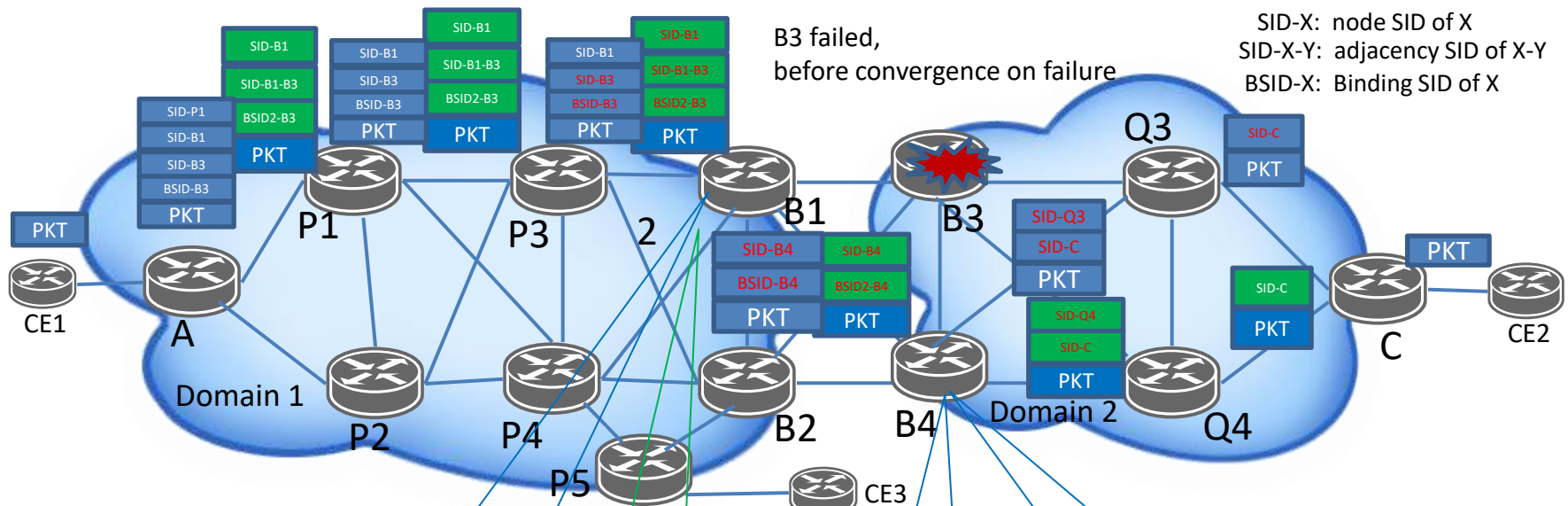
SR path 2: A->P1->B3->BSID-B3 (->Q3->C), BSID-B3: with list a={SID-Q3, SID-C}
SID-P1, SID-B1, SID-B3, BSID-B3 Two Domains(OAD) list b={SID-B4, SID-Q3, SID-C}

SR path 3: A->B1->B3->BSID2-B3 (->Q3->C), BSID2-B3: with list a={SID-B3-Q4, SID-C}
SID-B1, SID-B1-B3, BSID2-B3 Two Domains(OAD) list b={SID-B4, SID-Q4, SID-C}

B1 as PLR detects failure:
 pops SID-B1, SID-B1-B3,
 replaces BSID2-B3 with b={SID-B4, SID-Q4, SID-C}
 sends packet to SID-B4 using TI-LFA

B1 as PLR detects failure:
 pops SID-B1, SID-B3,
 replaces BSID-B3 with b={SID-B4, SID-Q3, SID-C}
 sends packet to SID-B4 using TI-LFA

TAD: B3 with BSID-B3 on SR path 2, with BSID2-B3 on SR path 3 failed



SR path 2: A->P1->B3->BSID-B3 (->Q3->C), BSID-B3: with list a={SID-Q3, SID-C, BSID-B4 with list c={SID-Q3, SID-C}
SID-P1, SID-B1, SID-B3, BSID-B3 Two Domains (TAD) list b = {SID-B4, BSID-B4}

SR path 3: A->B1->B3->BSID2-B3 (->Q3->C), BSID2-B3: with list a={SID-B3-Q4, SID-C}, BSID2-B4 with list c={SID-Q4, SID-C}
SID-B1, SID-B1-B3, BSID2-B3 Two Domains (TAD) list b = {SID-B4, BSID2-B4}

B1 as PLR detects failure:
 pops SID-B1, SID-B3,
 replaces BSID-B3 with b={SID-B4, BSID-B4}
 sends packet to SID-B4 using TI-LFA

B1 as PLR detects failure:
 pops SID-B1, SID-B1-B3,
 replaces BSID2-B3 with b={SID-B4, BSID2-B4}
 sends packet to SID-B4 using TI-LFA

B4: pops SID-B4,
 replaces BSID-B4 with c={SID-Q3, SID-C}
 sends packet to SID-Q3 along shortest path

B4: pops SID-B4,
 replaces BSID2-B4 with c={SID-Q4, SID-C}
 sends packet to SID-Q3 along shortest path

Next Steps

- Welcome comments