SR-MPLS FRR Extension

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

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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

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

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

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
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
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}; BSID-B4 with SID-list c
BSID2-B3 on path 3, SID-list b={SID-B4, BSID2-B4}; BSID2-B4 with SID-list c

b OAD (One SP Administrate 2 Domains) b = SIB-B4 + c if OAD

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

b = c if Single domain

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}; BSID-B4 with SID-list c
BSID2-B3 on path 3, SID-list b={SID-B4, BSID2-B4}; 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 Adminstrate 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}

B1 failed, before convergence on failure

P3 as PLR detects failure:  
pops SID-B1,  
replaces BSID-B1 with b={SID-B2,SID-P5}  
sends packet to SID-B2 using TI-LFA

B1 failed, after convergence on failure

P1 as endpoint determines SID-B1 failed:  
pops SID-B1,  
replaces BSID-B1 with b={SID-B2,SID-P5}  
sends packet to SID-B2 along shortest path

SID-X: node SID of X  
SID-X-Y: adjacency SID of X-Y  
BSID-X: Binding SID of X
OAD: 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}
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 BSID-B3 with b={SID-B4, SID-Q3, SID-C}
sends packet to SID-B4 using TI-LFA

B3 failed, before convergence on failure
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}

B3 failed, before convergence on failure

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

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

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

- Welcome comments