

Update on  
**draft-bashandy-rtgwg-segment-routing-ti-lfa**

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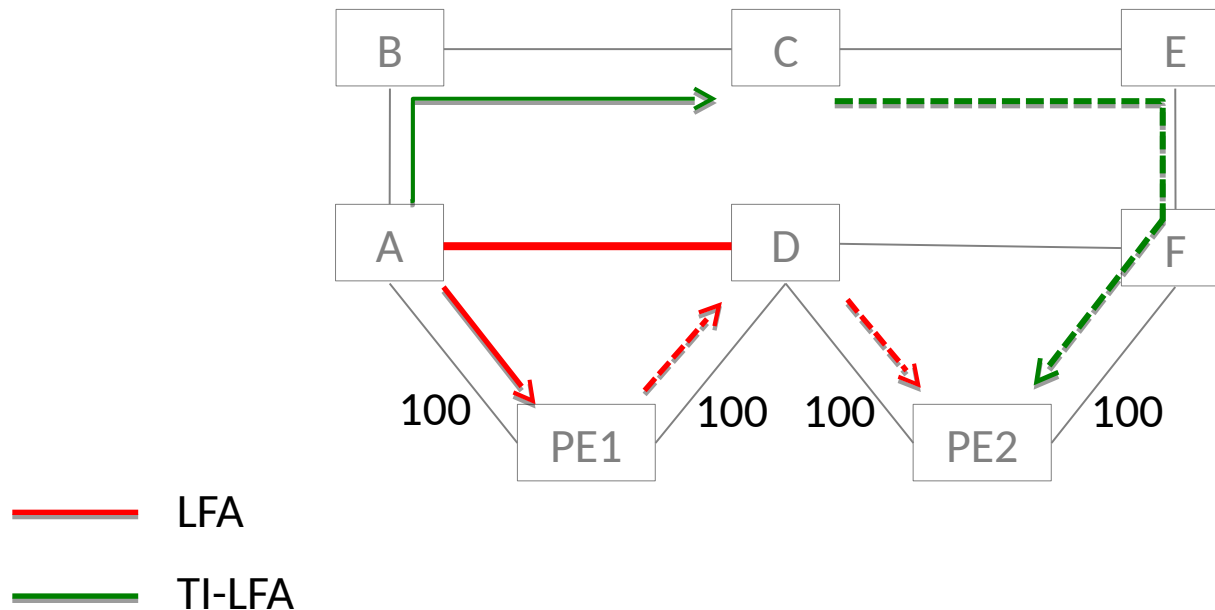
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# Brief Memory Refresh

- SR Ti-LFA Fast Reroute
  - Local protection of traffic against sudden failures of links and nodes
  - IP-FRR behavior when SR comes into play
- Topology Independent *coverage*
  - Full coverage for *link, node, local SRLG* protection
- Segment Routing
  - Leveraging the SR architecture allows to enforce any failover path
- Prefix and adj-SID protection
- Implementations already available

# Which failover path?

- New in IP-FRR:  
**Post-convergence** path from the **PLR** to the destination  
Utilize ECMP even during convergence  
Works for both SR-MPLS and SRv6



# How many segments?

- Link protection, symmetric topology:
  - Maximum 2, guaranteed
  - Most often, 1 is enough
  - When a post-convergence LFA is available: 0
- Link protection, asymmetric topology
  - Many asymmetric nets where 2 was the max
  - A few cases here and there were a bit more are needed for a couple of links
- Node protection / Local SRLG protection
  - Almost Never more than 4, rarely more than 2

# Update on Comments

- We will take care of IPR disclosure
- The draft is specific to SR
- The draft protects normal **shortest** path as calculated by IGP as well as adj-SIDs
  - Protection of constrained paths is beyond the scope of the draft
- Security Consideration
  - The draft ensures loop-freeness flow over the post-convergence path **very shortly** after failure
  - Works with partial deployment
  - Can be viewed as a modest security enhancement

Ready for WG adoption

Update on  
**draft-bashandy-rtgwg-segment-routing-uloop**

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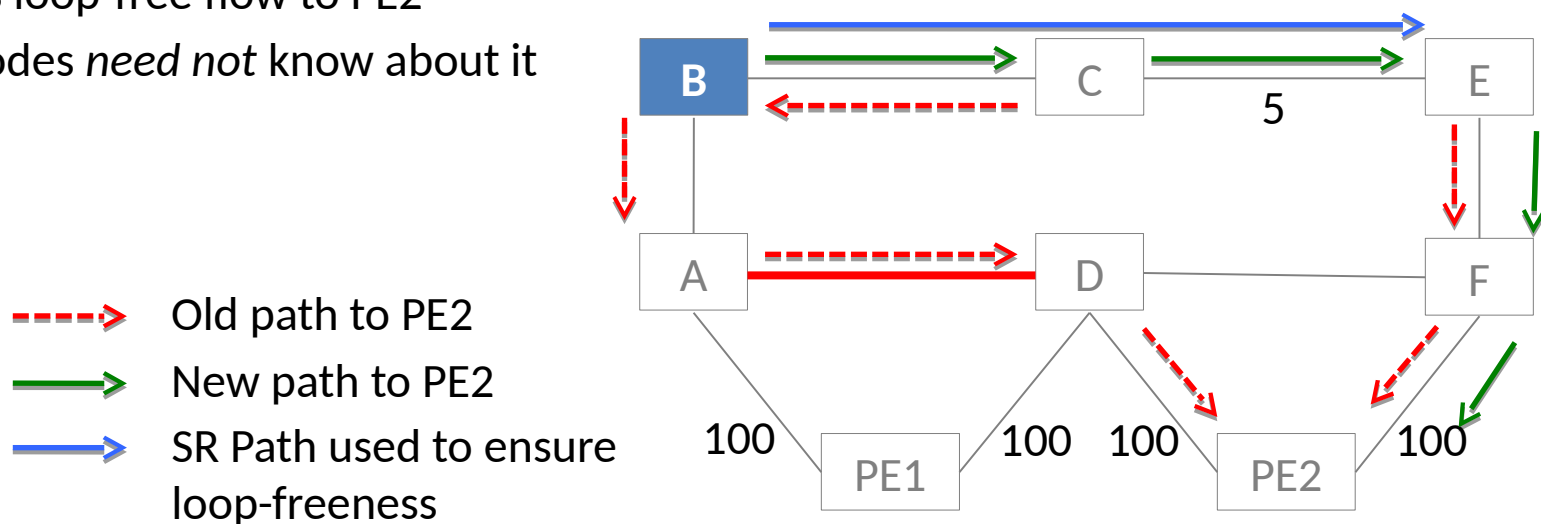
# Brief Memory Refresh

- Loop avoidance
  - Micro-loops happen during convergence of the IGP (Transient inconsistency among routers' FIB)
  - Approach to ensure the loop-freeness of a path followed by packets during the convergence, despite FIB inconsistency
- Loop avoidance using **Segment Routing**
  - Temporary use of Segment Routing policies which ensure a loop-free path during the convergence
- Difference with TI-LFA
  - TI-LFA is a fast reroute mechanism activated locally, at the point of failure
  - Loop avoidance happens during the re-convergence following a link state change, to ensure a loop-free transition to global post-convergence state



# Which loop-free path?

- Post-convergence path to the destination
  - Upon failure of A-D, when B reroutes destination PE2 to C, a micro-loop could occur between B and C (If B updates its FIB before C)
    - C was using B to reach PE2
  - B computes a sequence of intermediate hops that are ensured to be loop-free  
E.g: [AdjSID(C → E)], oif toC: enforces a loop-free path from B to PE2
    - The policy allows to convey the packet to E no matter the FIB state at C
    - E was already using E-F-PE2 to reach PE2
    - The policy hence ensures the *post-convergence* path
- Incremental Deployment
  - B ensures loop-free flow to PE2
  - Others nodes *need not* know about it



# 2 step convergence process

- Upon a topology change,
  - When a node R converging for destination D does not trust the loop-freeness of its post-convergence path for destination D
- Stage 1: For a configured amount of time C, R installs a FIB entry for D that steers packets to D into a loop-free SR path.
  - The SR path is computed when the event occurs.
- Stage 2: After C elapses, R installs the normal post-convergence FIB entry for D, i.e. without any additional segments inserted that ensure the loop-free property.

# How many segments?

- Complete coverage is guaranteed
- Link down,
  - symmetric topology:
    - Maximum 2, guaranteed
    - Most often, 1 is enough
  - asymmetric topology
    - A few cases here and there where a bit more will be needed for a couple of links
- Link up
  - Maximum 2, *guaranteed*

# Update on Comments

- IPR disclosures will be made
- Nits and clarification requests
  - Will be made
- What are the covered topology changes?
  - At this point in time, link and node up/down events
  - Future versions may limit the covered topology changes
- How to determine the time period between stage 1 and 2
  - Configuration or any mechanism can be used
  - Really not the topic of this draft
- Security consideration
  - Proposed mechanism moves traffic to post convergence path *faster*
  - Works even with partial deployment
  - Can be seen as a minor security enhancement

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Thank you!