Preferred Path Routing (PPR) Framework

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draft-chunduri-rtgwg-preferred-path-routing-01

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In this talk we will:

1. Provide a two-slide revision of what PPR is.
2. Show the use cases where we think PPR is advantageous
3. Encourage others to work with us on this technology.
PPR Overview

• PPR provides a method of injecting engineered paths into link-state IGPs.
• In the data plane the packet is mapped to its intended path by the PPR-ID.
• PPR-ID is a *single* identifier in the data packet.
• PPR can support multiple data plane types:
• PPR-D can be IPv6 addr, IPv4 addr, MPLS label, MPLS or IPv6 SID, MAC Addr.

See draft-chunduri-lsr-isis-preferred-path-routing for encoding detail
PPR Overview cont.

• PPR supports following connectivity structures:
  • Pt-Pt
  • Mp-Pt
  • Graphs

• PPR paths can be injected by a node (for its own purposes) or using SDN
• Enables engineered paths in cost sensitive network applications
• Runs on simple cheap hardware, has a small packet overhead, and a simple operational model.
• Open source FRR code exists demonstrated at IETF 105
PPR Use cases
PPR In Mobile Xhaul

Figure: Cellular Transport Network

--- Front and Layer2/Layer3-MidHaul (F1 Interface)
--- Backhaul (N3/N9 Network)

PPR in Xhaul (L2/IPv4/MPLS/IPv6 underlays)
Use Case: Cellular Transport and Edge Networks

- Large Ring/Subtended Topologies of Various size

- **Slicing**: Needs Strict Paths and Traffic Engineering

- Need TE aware fast-reroute

- Virtualized RAN Networks with disaggregated 5G RAN (DU, CU) with L2 and IPv4 ➔ Cost sensitive
Use Case: PPR In Edge Networks

- Leaf-Spine Edge Fabrics
- Edges are not MSDCs
- Use IGP with IPv4 data plane
- Traffic prioritization for critical east-west traffic (virtualized 5G Infra)
- Redundancy and Granular path level OAM
Use Case: PPR Fast Reroute (TE Aware)

• Best effort/Shortest path:
  PE1-A-B-PE2

IPFRR/LFA paths for shortest path:
  PE1-C-D-E-F-PE2

• PPR TE Path1: PPR-ID: PE2’
  PE1-J-K-PE2

PPR TE Path2: PPR-ID: PE2”
  PE1-J-N-R-PE2

• Link failure between J and K
  • No Ingress PE switching and E2E multi-hop BFD
  • No controller roundtrips & no additional overhead with FRR label/SID stack
  • Local detection & activation at ‘J’ to new-PPR-TE path
  • TE aware loop free backup ➔ backup doesn’t resort to best effort loop free path

draft-bryant-rtgwg-plfa for more details
Other Use cases

• Method of constructing traffic-engineered segments in SR that does not introduce extra SIDs for engineered paths.
  • Can be used for signaling BSIDs
  • TI-LFA in IPv4, Ethernet and low overhead MPLS and SRv6

• Underlay for VPN+ (TE for any underlying data plane)

• No per algo metric and an extensible alternative to flex-algo (no 128 algo limitation)

• Energy efficient networks for many industry verticals
• Questions?

• Is anyone interested in collaborating with us on this technology?