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SR-MPLS Data Plane with IPv6 Control Plane
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Abstract

This document reminds the existence of the "Segment Routing (SR) MPLS data-plane with IPv6 control-plane" solution that is mature from a standardization, productization and commercial deployment viewpoint.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Introduction

This document reminds the existence of the "Segment Routing (SR) MPLS dataplane with IPv6 control-plane". This solution is mature from a standardization, productization and commercial deployment viewpoint. Other proposed source routing solutions with MPLS-like label lookup or mapping ids should list all their data-plane and control-plane differences with respect to this mature solution and should justify these differences with genuine benefits not available in the mature solution described in this document and others referenced here that are published by the SPRING and MPLS WGs.

2. Context

This is an existing solution.

- Mature IETF standardization
- Mature productization
- Commercially deployed

The IETF standardization references are:

- Architecture:
  - Segment Routing [RFC8402]
- Data-plane:
  - Homogenous MPLS deployment: [RFC8660]
  - Hopping over IP-only parts of network: [RFC8663]
- Control-plane:

* IS-IS: [RFC8667]

* OSPFv3: [RFC8666]

* BGP: [RFC4364]

* BGP-LS: [RFC9085]

* SR Policy headend: [I-D.ietf-spring-segment-routing-policy]

o Service programming: [I-D.ietf-spring-sr-service-programming]

o OAM: [RFC8287]

3. Reference diagram

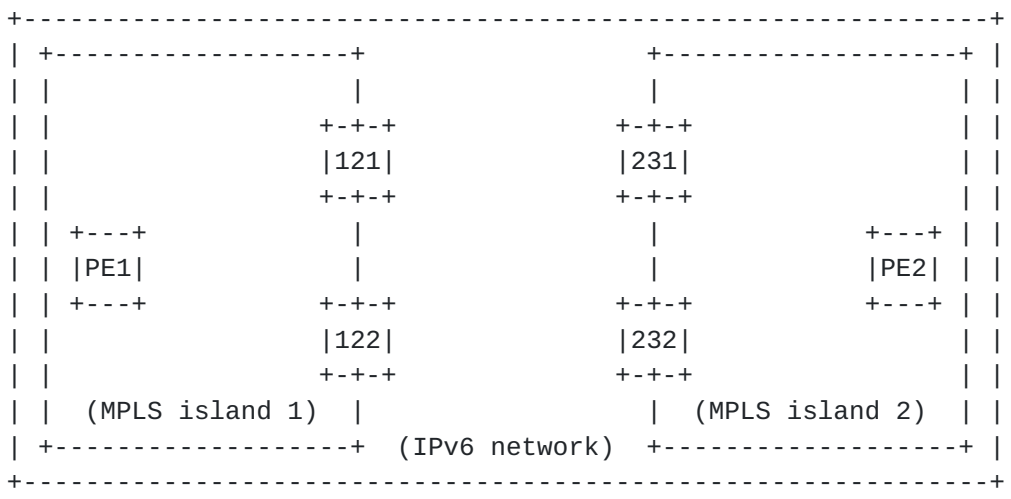

Figure 1: IPv6 network with SR-MPLS islands

o Single IGP domain, IPv6 only

* PE1 is configured with a loopback IP address 2001:db8::1

* PE2 is configured with a loopback IP address 2001:db8::2

* Each other node k is configured with a loopback IP address 2001:db8::k

o 2 SR-MPLS islands running with an IPv6 control plane

* PE1 is configured with a Prefix-SID 16001 associated with 2001:db8::1

* PE2 is configured with a Prefix-SID 16002 associated with 2001:db8::2

4. Packet processing

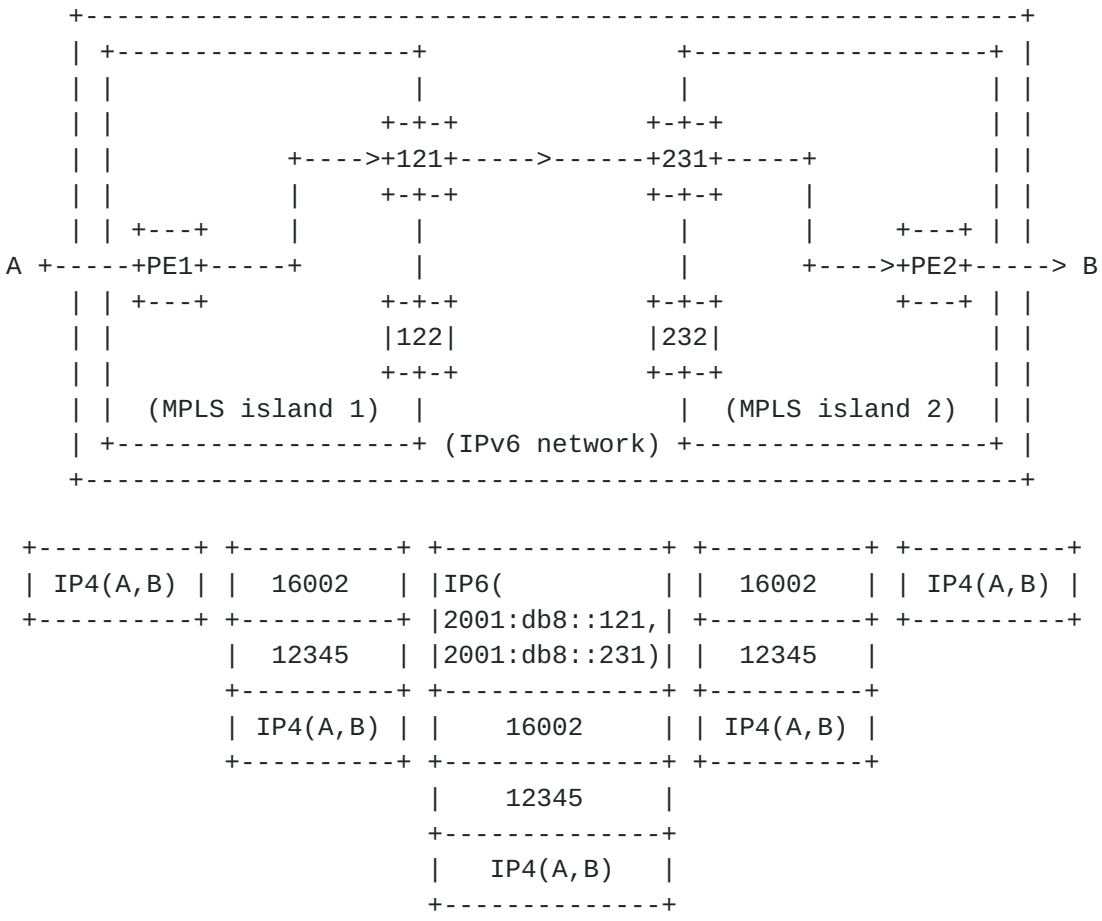

Figure 2: Packet processing in IPv6 network with SR-MPLS islands

- PE1 receives IPv4 traffic from A and headed to B
- PE1 PUSHes the VPN label 12345 and the prefix-SID 16002 of PE2
- Traffic is steered in MPLS island 1 according to the top label 16002
- Traffic reaches node 121, whose next-hop towards 16002 is not MPLS-enabled
  * Node 121 has determined(*) that traffic to 16002 should be sent over an IPv6 encapsulation to node 231

  * Node 121 encapsulates the traffic with IPv6 header (Next Header 137 [RFC4023]) to 2001:db8::231

- Node 231 removes the IPv6 encapsulation, exposes the MPLS label 16002 and forwards the traffic accordingly

- Traffic is steered in MPLS island 2 according to the top label 16002

- (PHP: Penultimate node POPs label 16002 and sends the traffic to PE2)

- PE2 looks up the exposed VPN label 12345 and forwards the traffic accordingly.

(*) Node 121 determines that node 231 is the closest MPLS- and IPv6-pop-capable node on the shortest path to PE2 using a technique outside the scope of the document.

5. Security Considerations

None

6. IANA Considerations

None

7. Acknowledgements

TBD

8. Informative References

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