Simplified MVPN for BIER and IR

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Background

RFC6037: firstly proposed MVPN; PIM was the only protocol to build PMSI tunnels

RFC6513, 6514: RSVP-TE, mLDP and Ingress Replication tunnel for MVPN

- Inclusive PMSI: ANY PE attaching to a particular MVPN can transmit and receive message
- Selective PMSI: A subset of PE attaching to a particular MVPN can receive

To trade off between Optimality and Scalability, both inclusive and selective multicast are supported

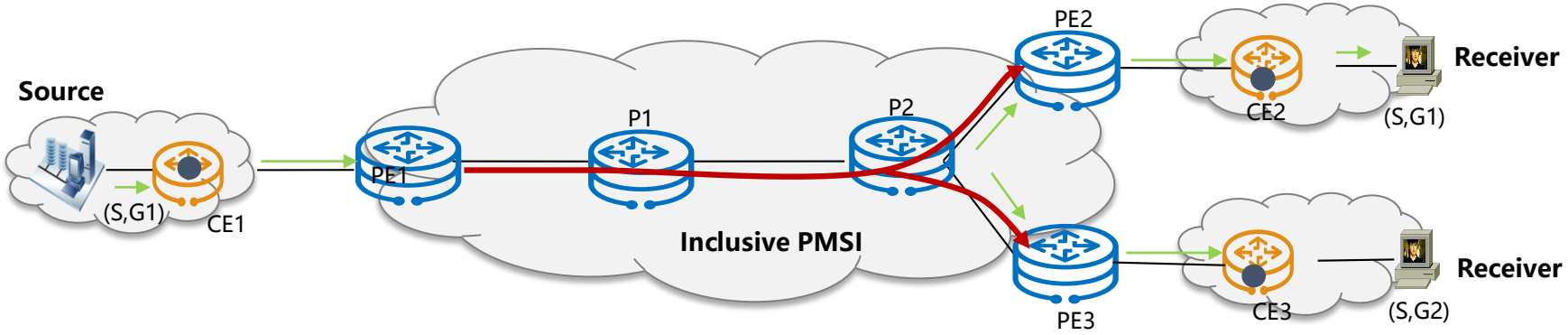
Seven MCAST-VPN NLRIs involved to establish multicast forwarding tree

RFC8534: Explicit Tracking in MVPN

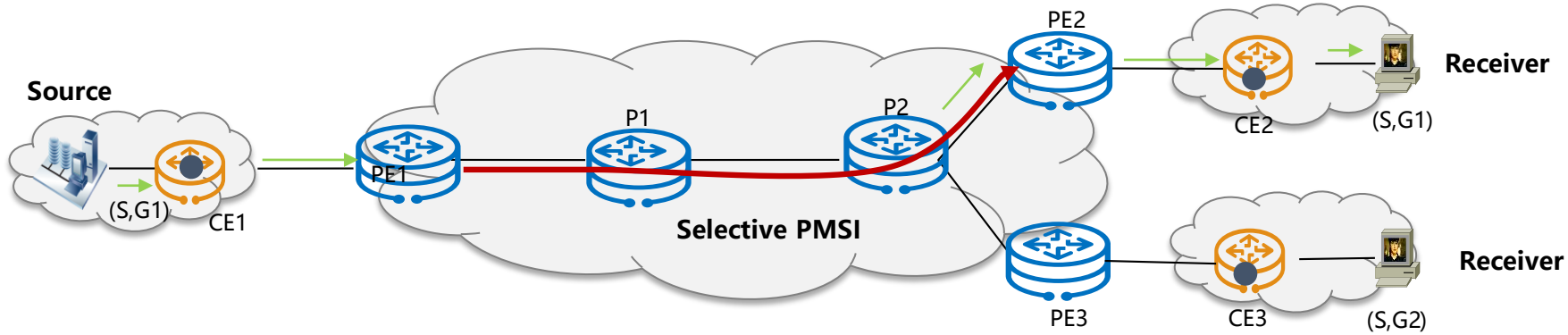
RFC8556: BIER as one tunnel type to optimize multicast forwarding

Selective Multicast in P2MP Tunnel

Instantiate inclusive-PMSI is a common first step to establish MDT over provider network



When traffic exceeds preset threshold, switching from I to S PMSI is inevitable for mLDP or RSVP-TE



Problems

Selective multicast is necessary for P2MP tunnel for saving bandwidth

But for BIER and IR, complicated NLRI exchange and switching from I- to S-PMSI tunnel are not necessary

Ingress PE:

- Follows traditional process of establishing multicast tunnel
- Maintain and check whether multicast flow at any time so to switching from I- to S-PMSI
- Very complicated exchange of control-plane and data-plane

Service provider backbone:

- Three types of NLRIs involved in process of customer's routes advertisement
- Four types of NLRIs are leveraged to collect tunnel informations

Solution

Constructing S-PMSI tunnel directly:

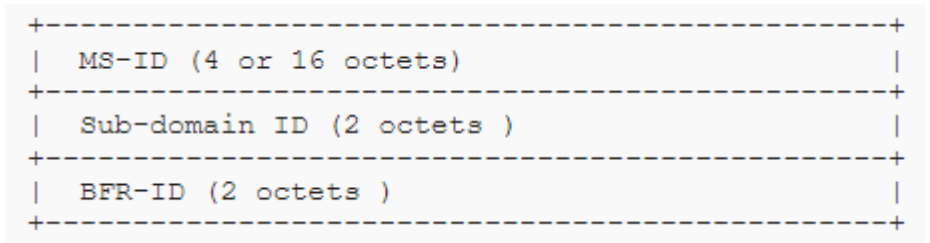
- Current MVPN architecture and NLRI exchanges are too heavy
- Architectural advantages of BIER and IR : intrinsically support explicit tracking at ingress PE
- Each leaf PE is unique

-------> No inclusive PMSI tunnel

Segment routing is widely discussed, implemented and regarded as a simplification of MPLS

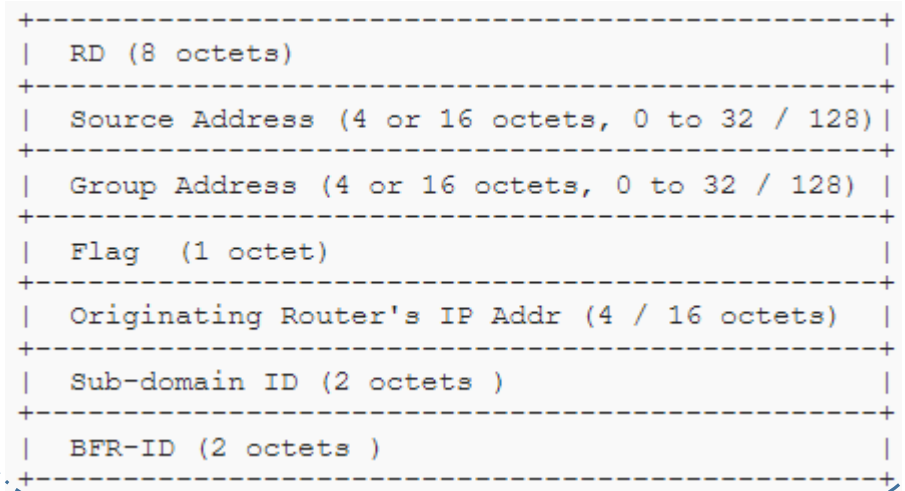
Simplify type 1-4 NLRIs with:

New MVPN Eligible UMH Route

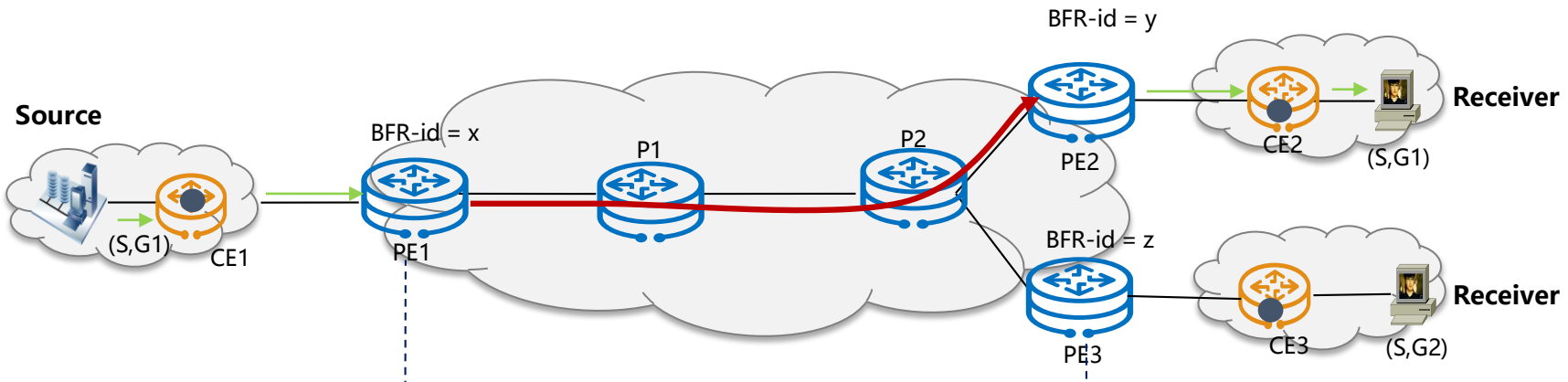


Simplify type 6-7 NLRIs with:

New Per-Leaf C-multicast(S/*,G) Route



Solution – NLRI Exchange



- Always selective multicast forwarding
- No IPMSI to SPMSI switching
- No more NLRI Type-1/2/3 route

S/RP UMH route：

1 BIER/IR PTA, MSID

VRF Import RT，Source AS

Per-Leaf C-multicast(S/*,G) route (new)：

RD+S/*+G+Root+Leaf 2

- No need to separate C-multicast and Leaf-AD
- Always explicit tracking
- Merge NLRI Type-4/6/7 route as (S,G,R,L)
- No more NLRI Type-5 route

Next Steps

- BESS WG reviews and comments
- Optimize solutions

Thanks