

Network Resource Programming with SRv6

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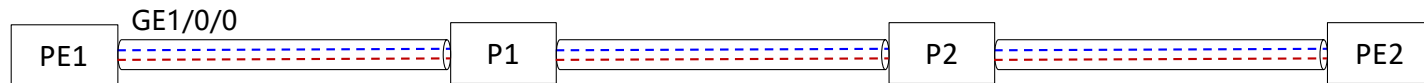
Introduction

- **The concept of Network Resource Partition (NRP) is introduced in [I-D.ietf-teas-ietf-network-slices]:**
 - An NRP consists of a subset of the buffer/queuing/scheduling resources on each of a connected set of links in the underlay network.
- RFC8986 has defined a set of well-known SRv6 Endpoint behaviors that **are not associated with a set of NRP** of the links for slices/slice aggregate.
 - e.g. End.X just forwards to an endpoint with cross-connect to a 'layer-3 adjacency'
- **Define a new SRv6 Endpoint behavior** which can be used to associate with a set of NRP(e.g. dedicated queues resources , Layer-2 logical sub-interfaces) , called **End.NRP**

Uses of End.NRP SID

- mainly used to steer traffic forwarding through the associated NRP .
- **By using the End.NRP SID to build its segment list , the SRv6 policy has the capability to program network resources and achieve strict SLA guarantees.**
- For one IGP link, multiple End.NRP SID should be allocated, **each of which is associated with a subset of link resources**, such as dedicated queues, Layer-2 logical sub-interfaces, etc.

Picture 1



PE1

OutBound	End.NRPSID	NRP
GE1/0/0	A:1::11	GE1/0/0.Queue1: 1G BW
GE1/0/0	A:1::22	GE1/0/0.Queue2: 2G BW

- End.NRP SID A:1::11 is associated with NRP(GE1/0/0.Queue1), indicates PE1 to forward traffic to P1 via this NRP.
- End.NRP SID A:1::22 is associated with NRP(GE1/0/0.Queue2), indicates PE1 to forward traffic to P1 via this NRP.

Processing of End.NRP Behavior

- The End.NRP behavior is a variant of the End.X behavior defined in [RFC8986].

Any SID instance of End.NRP behavior is associated with two sets: J1 and J2.

- J1: one or more L3 adjacencies
- J2: NRP of J1

When N receives a packet destined to S and **S is a local End.NRP SID**, the line S15 of the End.X processing defined in RFC8986:

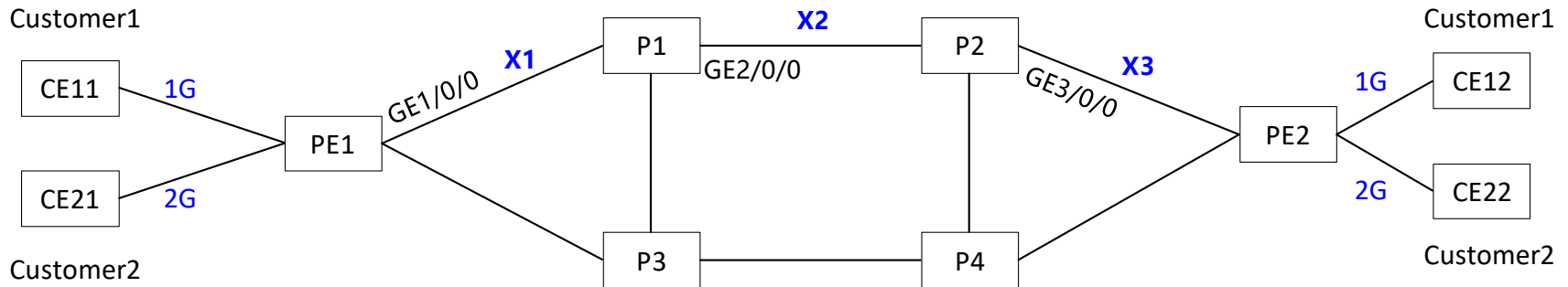
S15. Submit the packet to the IPv6 module for transmission to the new destination via a member of J

is replaced by the following:

S15. Submit the packet to the IPv6 module for transmission to the new destination via a member of J1, using the NRP identified by J2

Use Case

- Two customers with different leased line requirements from PE1 to PE2:
 - leased line1: 1G BandWidth with strict SLA guarantee
 - leased line2: 2G BandWidth with strict SLA guarantee



- Building SRv6 policy :
 - calculates SRv6 policy paths based on SLAs, Such as <X1, X2, X3>
 - NRP reservation and the End.NRP SID allocation** along the SRv6 Policy path

Taking node PE1 as an example, Two different NRPs(e.g. two dedicated queues) are partitioned from the network resources of the physical link X1 (GE1/0/0)

OutBound	End.NRP SID	NRP
GE1/0/0	A:1::11	GE1/0/0.Queue1: 1G BW
GE1/0/0	A:1::22	GE1/0/0.Queue2: 2G BW

Tabel1: NRP reservation on link X1(PE1-P1) and association with End.NRP SID

Use Case

3. uses the End.NRP SIDs on link X1, X2, and X3 to build the SID lists of SRv6 policy path

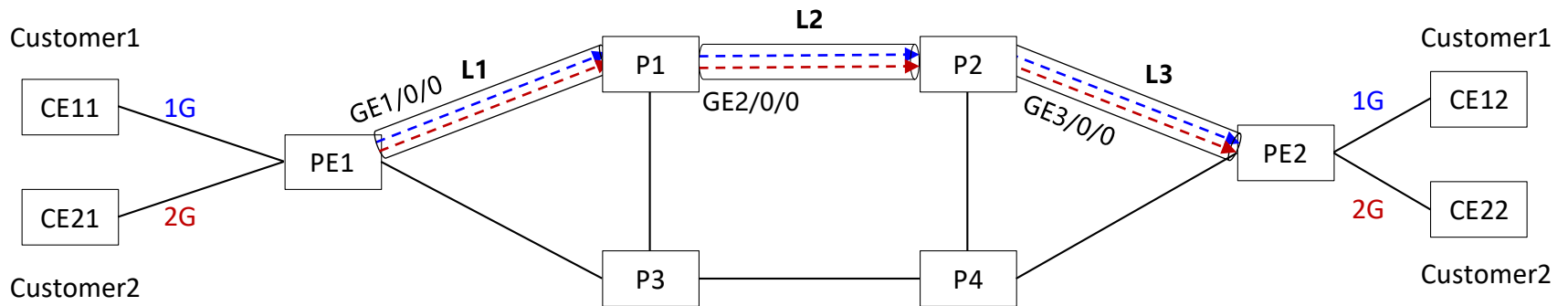
- ✓ SRv6 Policy1: < A:1::11, A:2::11, A:3::11 >
- ✓ SRv6 Policy2: < A:1::22, A:2::22, A:3::22 >

Picture 2

P1: NRP reservation on link X2 and association with End.NRP SID

OutBound	End.NRP SID	NRP
GE2/0/0	A:2::11	GE2/0/0. Queue1: 1G BW
GE2/0/0	A:2::22	GE2/0/0. Queue2: 2G BW

- - - - - SRv6 Policy1
- - - - - SRv6 Policy2



OutBound	End.NRP SID	NRP
GE1/0/0	A:1::11	GE1/0/0. Queue1: 1G BW
GE1/0/0	A:1::22	GE1/0/0. Queue2: 2G BW

OutBound	End.NRP SID	NRP
GE3/0/0	A:3::11	GE3/0/0. Queue1: 1G BW
GE3/0/0	A:3::22	GE3/0/0. Queue2: 2G BW

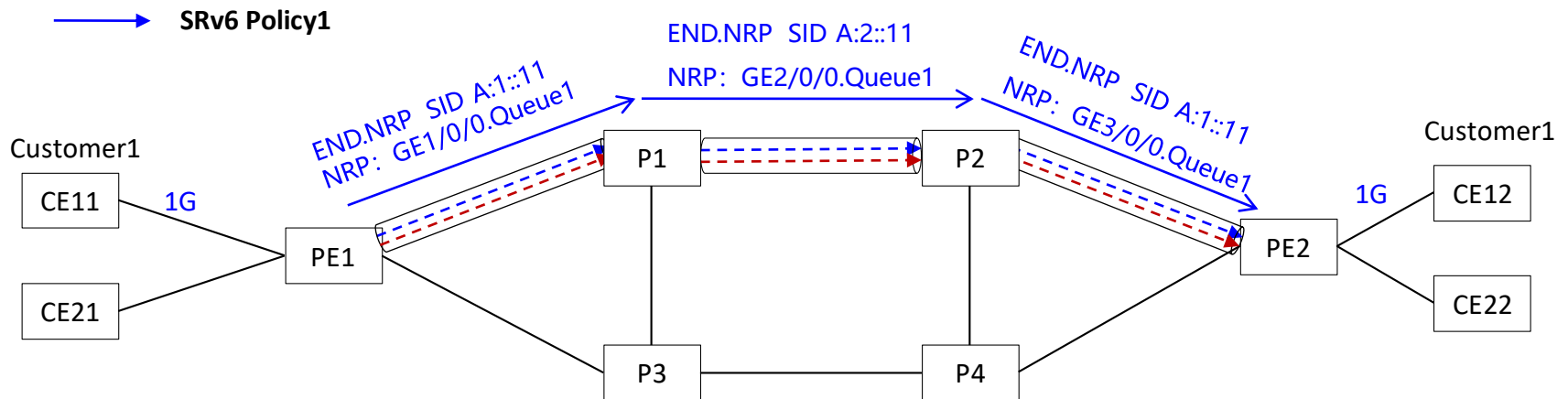
PE1: NRP reservation on link X1 and association with End.NRP SID

P2: NRP reservation on link X3 and association with End.NRP SID

Use Case

- Traffic from customer1 will be forwarded to PE2 via the NRP previously reserved for the per-hop link on the SRv6 Policy1 path.

SRv6 Policy1 Segmentlist: < A:1::11 、 A:2::11 、 A:3::11 >
SRv6 Policy1 **per-hop link NRP**: < PE1:GE1/0/0.Queue1、 P1:GE1/0/0.Queue1、 P2:GE3/0/0.Queue1 >



- Providing Customer 1 with an end-to-end 1G bandwidth resource for leased line services with strict SLA guarantee.

Next Step

- Welcome review and comments.

Thank you!