Network Resource Partition Identifier (NRP-ID) in SRv6 segment

draft-liu-spring-nrp-id-in-srv6-segment-00

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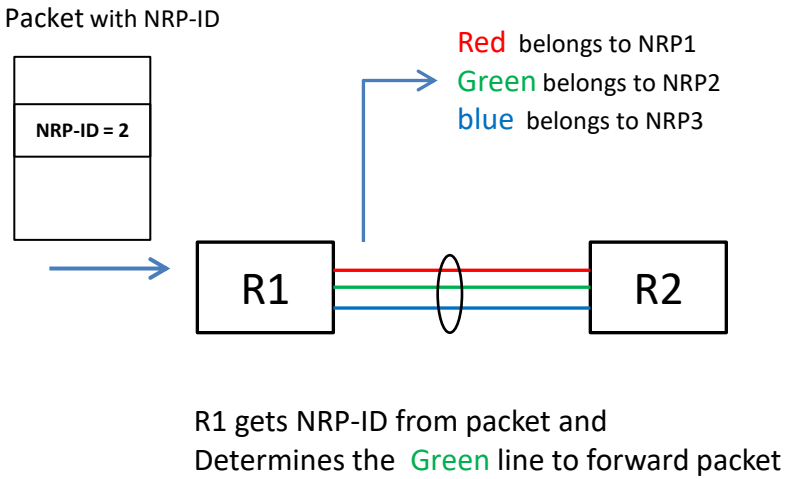
Background

- ✓ Network slicing partition a physical network into multiple isolated logical networks.
- ✓ A network slice associates specific network resource, which is called Network Resource Partition (NRP) in [I-D.draft-ietf-teas-ietf-network-slices]
- ✓ NRP-ID is used to identify the NRP during packet forwarding.
- ✓ NRP-ID can be carried in the packet
- ✓ Router can use NRP-ID to determine the NRP, and forward the packet using the resources associated with the NRP.

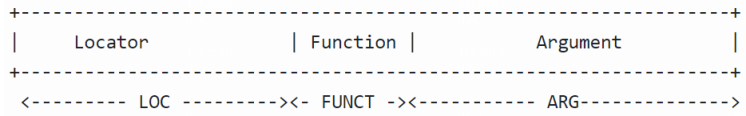
This draft proposes a method to carry NRP-ID with packet, when SRv6 network provides network slicing service.



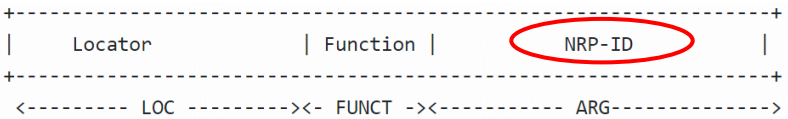
R1 gets NRP-ID from packet and
Determines the Green line to forward packet

Encoding NRP-ID in SRv6 Segment

- ✓ As defined in RFC[8986], An SRv6 segment consists of three parts, LOC:FUNCT:ARG.



- ✓ In the SRv6 TE mode, the segments of intermediate endpoint are usually End or End.X segment.
  NRP-ID can be encoded in ARG field of these segment s



- ✓ Segments in SRH can carry the **same** or **different** NRP-IDs, which is arranged by the controller or operator by CLI according to the actual requirement.

```
Segment[0]:
+-----------------------------------------------------------------+
|     Locator5          | Function |          Argument            |
+-----------------------------------------------------------------+
Segment[1]
+-----------------------------------------------------------------+
|     Locator4          | Function |           NRP-ID2            |
+-----------------------------------------------------------------+
Segment[2]
+-----------------------------------------------------------------+
|     Locator3          | Function |           NRP-ID2            |
+-----------------------------------------------------------------+
Segment[3]
+-----------------------------------------------------------------+
|     Locator2          | Function |           NRP-ID1            |
+-----------------------------------------------------------------+
Segment[4]
+-----------------------------------------------------------------+
|     Locator1          | Function |           NRP-ID1            |
+-----------------------------------------------------------------+
```

NRP-ID position information advertisement

When creating **locator**, the SRv6 node need to determine the **encoding position of NRP-ID** in the segment. And the encoding position information should be advertise to **controller** or other network **nodes**

✓ **Static configuration mode**

slice prefixes (locator encoding information) are configured on

- Controller
- Network nodes (Including **SRv6 nodes** and **IPv6-Only nodes**)

A **slice prefix** include :

- prefix
- Encoding position in Segment

✓ **Dynamic advertising mode**

slice prefix can be advertised by

- **BGP-LS** to controller
- **IGP** to SRv6 nodes in the domain

Note: IPv6-only nodes still need static configuration.

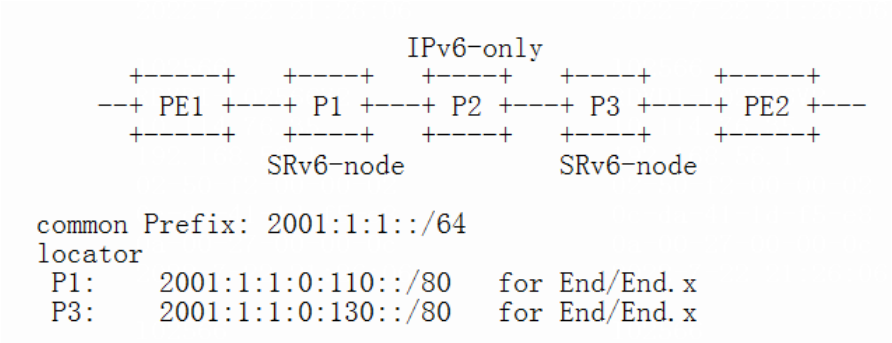
The Protocol extensions will be provided in future versions…

LSPT(local slice prefix table)

Network nodes will create a local slice prefix table (**LSPT**) on the forwarding plane.

Through **LSPT**

- **Headend**: Writes NRP-ID into segment
- **Intermediate** Nodes: extract NRP-ID from destination address



local slice prefix table

Slice-Prefix1: 2001:1:1:0:110::/80 (locator for P1)

NRP-ID Position: [112..127]

Slice-Prefix2: 2001:1:1:0:130::/80 (locator for P3)

NRP-ID Position: [96..112] in segment

Example

Preset conditions:

- **2 NRPs** are created , NRP1(**NRP-ID1**) and NRP2(**NRP-ID2**), NRP1 guarantees 100Mbps and NRP2 guarantees 200Mbps bandwidth
- Dedicated queues with guaranteed bandwidth for NRP1 and NRP2
- SRv6 Policy on PE1, including segment list: <**P1.End, P3.End**>

```
----------------------------------
>>>>>>Queue 1: NRP-ID1, 100Mbps>>>>>>
>>>>>>Queue 2: NRP-ID2, 200Mbps>>>>>>
>>>>>>          ...          >>>>>>
----------------------------------
```

Forwarding behavior:

PE1 as Headend:

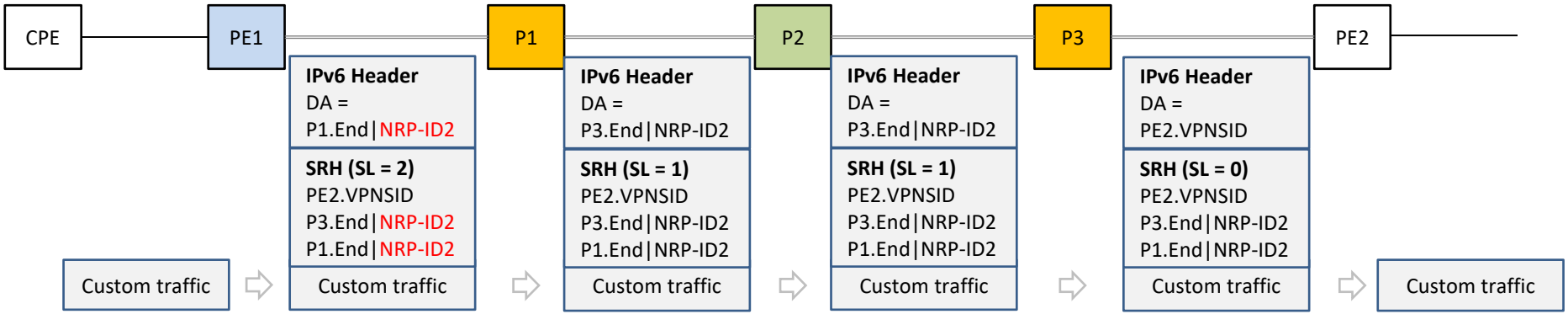
- Determines the NRP
- Encapsulates SRH and IPv6
- Writes NRP-ID based on LSPT

P1 & P3 as Endpoint:

- Extracts NRP-ID from segment
- Updates destination address
- Forwards packet with queue of NRP2

P2 as transit node:

- Lookups LSPT with destination address
- Extracts NRP-ID from destination address based on lookup result
- Forwards packet with queue of NRP2



Next Steps

- Questions or comments are Welcomed
- Seeking for feedback