

Segment Routing based Solution for Hierarchical IETF Network Slices

draft-gong-teas-hierarchical-slice-solution-00

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IETF-115

Background

✓ Network slicing

partition a physical network into multiple isolated logical networks of varying sizes

✓ IETF Network Slice

defined by [I-D.ietf-teas-ietf-network-slices] with general principles of network slicing

✓ Network Resource Partition (NRP):

collection of resources in the underlay network. A NRP support one or a group of IETF network slice services

✓ hierarchical IETF network slices

a network slice can be further sliced into other network slices. [I-D.dong-teas-hierarchical-ietf-network-slice] describes the possible scenarios :

level-1 can be industry slices; level-2 can be customer slices

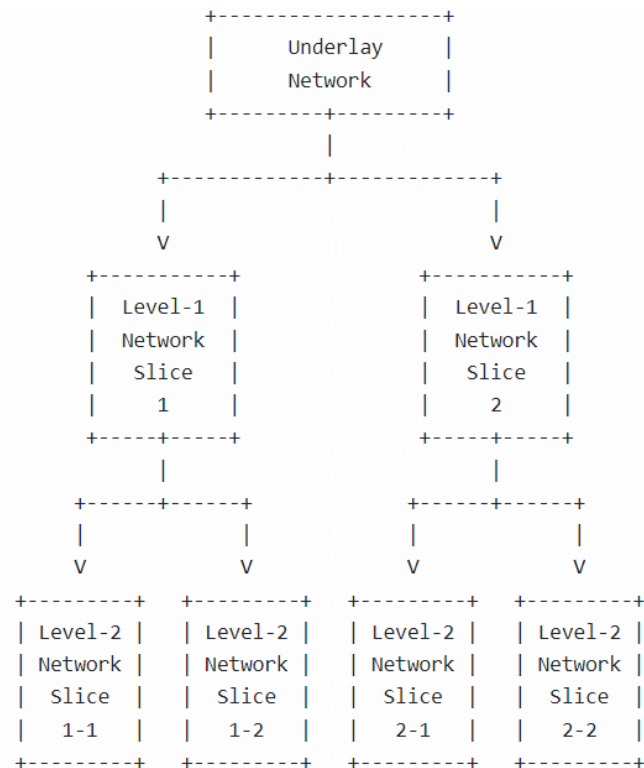
This draft proposes a **two-level hierarchical IETF network slices solution** based on **Segment routing**.

Level-1 network slice : realized by associating Flex-Algo with dedicated sub-interfaces

Level-2 network slice :realized by using SR Policy with additional NRP-ID on data plane

Has been presented in TEAS WG on 114 meeting and suggested presenting to SPRING WG

Two-level Hierarchical IETF Network Slices Architecture



2 Level hierarchical Slice based on Segment routing

✓ Level-1 network slice

Topology for Level-1 network slice: associated with a **Flex-Algo**

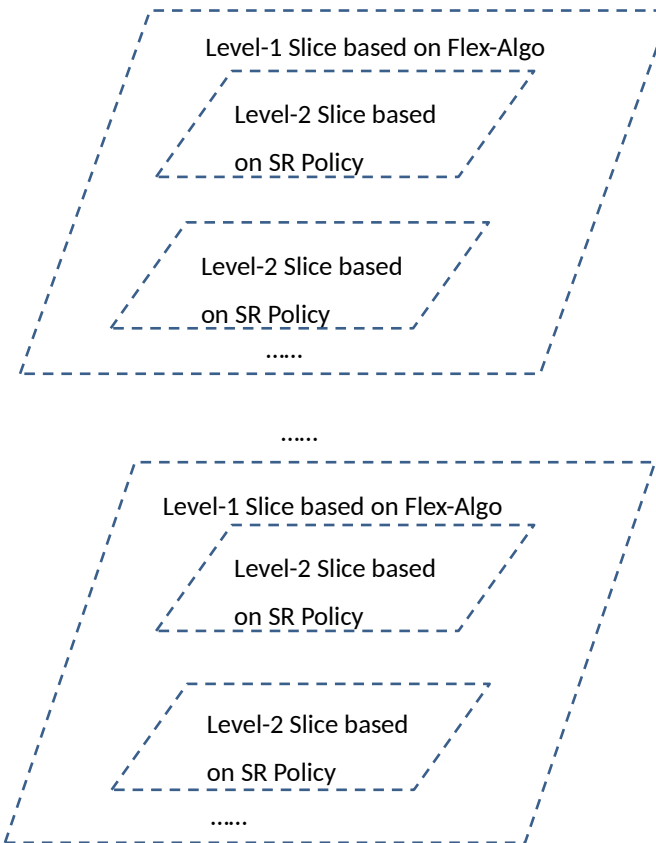
(All the nodes belong to the level-1 NRP participate in the associated Flex-Algo)

Traffic Forwarding: Traffics of the level-1 network slices are steered into the Flex-Algo paths by using Prefix-SIDs or SRv6 locators

✓ Level-2 network slice

Topology for Level-2 network slice: Specify the path on the level-1 NRP through SR policy.

Traffic Forwarding: Traffics of the level-2 network slice are steered into the SR Policies.



network resources for the two-level network slices

bandwidth resource of a physical interface is partitioned in a hierarchical manner

✓ **Bandwidth for Level-1 network Slice**

is guaranteed by layer-3 sub-interfaces with dedicated bandwidth.

layer-3 sub-interface is

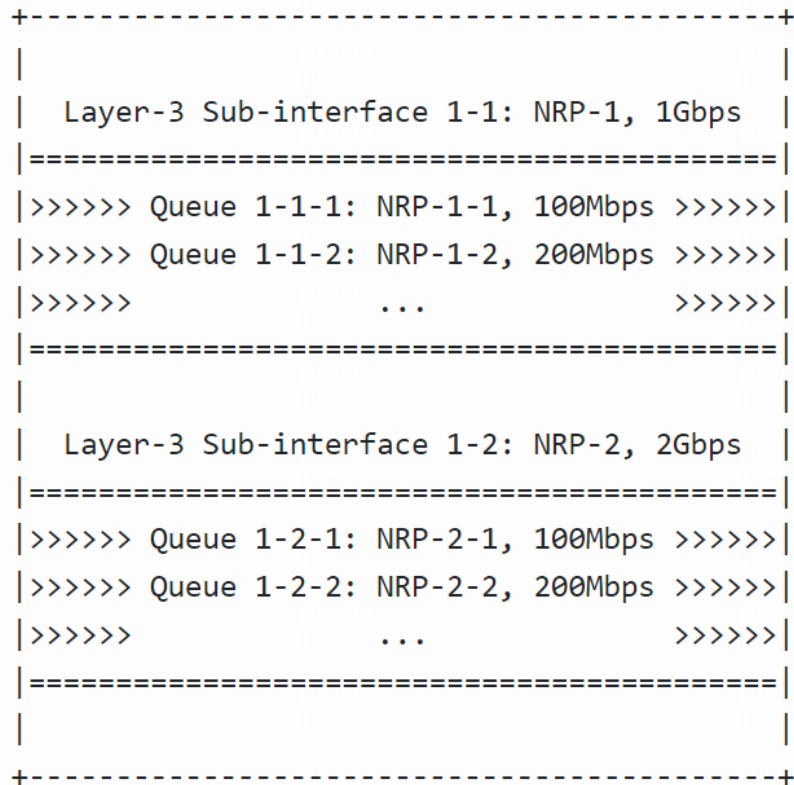
- included by the Flex-Algo which is associated with the level-1 NRP
- excluded by irrelevant Flex-Algos

Data plane Identifier: Prefix-SIDs or SRv6 locators associated with Flex-Algo

✓ **Bandwidth for Level-2 network Slice**

is guaranteed by HQoS queues with dedicated bandwidth under the layer-3 sub-interface of level-1 NRP

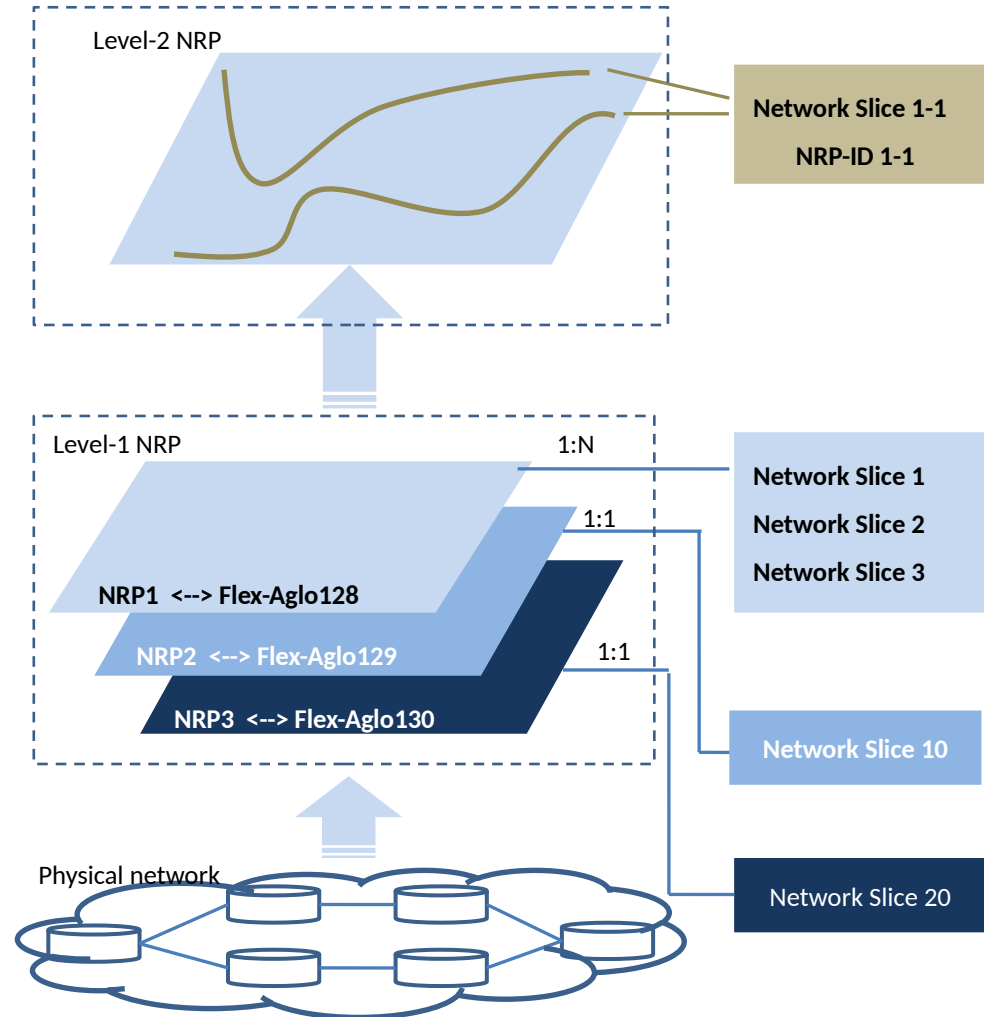
Data plane Identifier: NRP-ID associated with HQoS Queue



NRP vs Network Slice

Each NRP can be used to support one or a group of network slice

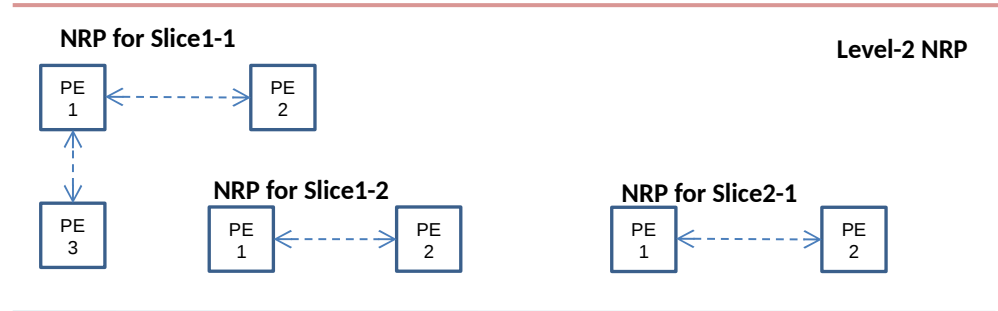
- ✓ **Level-1 NRP**
 - **1:N.** multiple level-1 network slices share one level-1 NRP means these level-1 network slices associate one Flex-Algo
 - **1:1.** One Level-1 NRP supports one Level-1 network slice
- ✓ **Level-2 NRP**
 - **1:1.** One Level-2 NRP supports one Level-2 network slice



Example --- Slice service planning and requirements

Slice Service Planning

- ✓ **2 Level-1 slice**
 - **Slice1 for education** -- FlexAlgo 128
 - **Slice2 for healthcare.** -- FlexAlgo 129
- network slice and NRP are 1:1



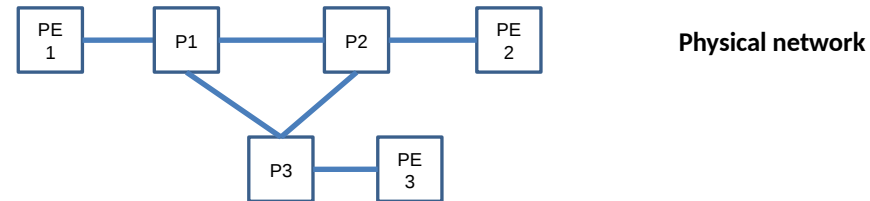
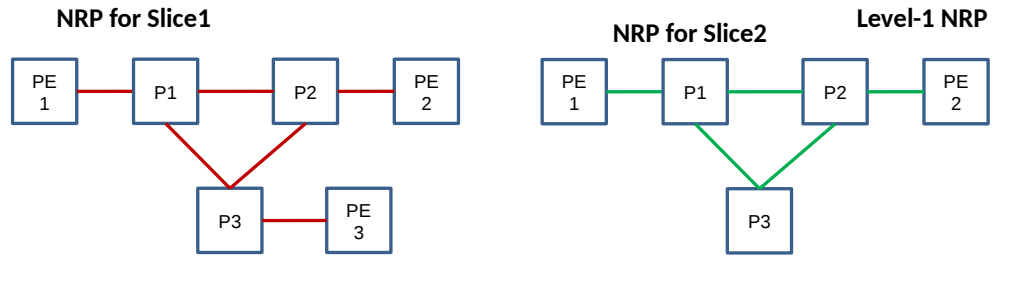
Requirements

- ✓ **Slice1**

2 customer require **Level-2 slice**

 - **University 1.** interconnection between PE1 and PE2 and interconnection between PE1 and PE3
 - **University 2.** interconnection between PE1 and PE2
- ✓ **Slice2**

1 customer requires Level-2 slice



Example --- Traffic forwarding

Taking PE1 as an example

✓ Forwarding on Level-1 Slice

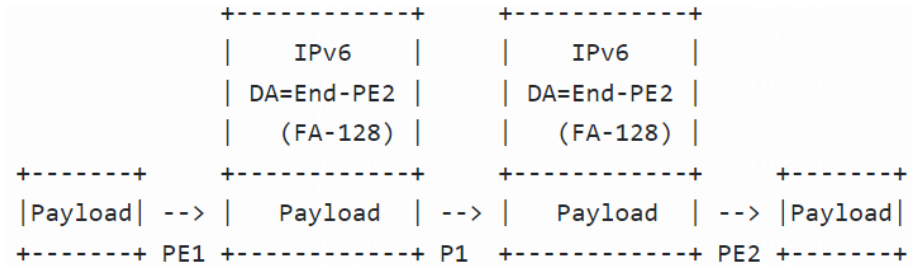
From University 1 (PE1) to University 2 (PE2) on **Slice1**

- **Encapsulation:**
Destination is END SID of PE2 associated with FlexAlgo128
- **Path:**
PE1->P1->PE2. through **layer-3 sub-interface**

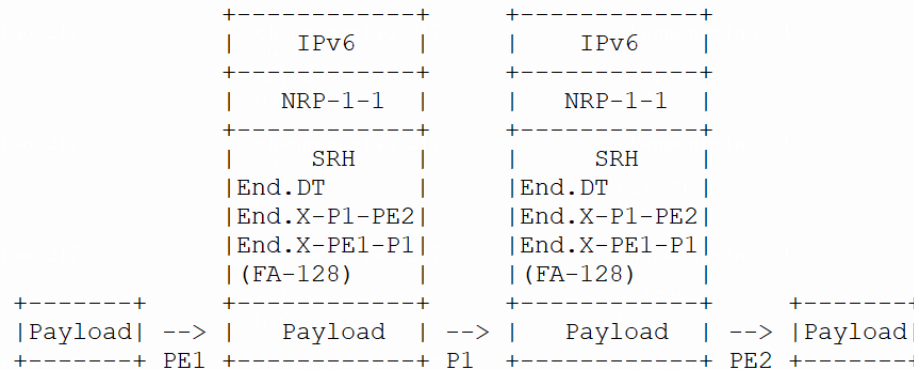
✓ Forwarding on Level-2 Slice

Form campus of university 1 at PE1 to campus at PE2 on **Slice1-1**

- **Encapsulation**
The level-2 NRP-ID of Slice1-1
All segments in SRH are associated with Flex-Algo 128
- **Path**
PE1->P1->PE2. through the **HQoS queue**



Forwarding on Level-1 Slice



Forwarding on Level-2 Slice

Next Steps

- Any questions or comments are Welcomed
- Presented in TEAS WG on 114 meeting, and no objection received. Seeking for feedback in SPRING WG.
- Ask for Adoption?

Thank You