Packet Network Slicing using Segment Routing

draft-peng-teas-network-slicing-01

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# Existing Identifiers Overview

<table>
<thead>
<tr>
<th>REQ1: Dedicated Virtual Networks</th>
<th>REQ2: End-to-End Slicing</th>
<th>REQ3: Unified NSI</th>
<th>REQ4: Traffic Engineering</th>
<th>REQ5: Layer 2 / Layer 3 link resource partition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG and EAG Bit</td>
<td>✓</td>
<td>✓</td>
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<td></td>
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<tr>
<td>Multi-Topology Identifier</td>
<td>✓</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>SR Policy Color</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Flex-algorithm Identifier</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All (Administrative Instance Identifier)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
All Overview

• **All** (Administrative Instance Identifier): Explicit virtual network identification, it could be used as a **TN-slice identifier**, it indicates the topology, computing, storage resources of the dedicated virtual network.
  – **All** is the identifier of the **dedicated Virtual Networks for the slice**.
  – Support the **End-to-End Slicing**.
  – **Identifier the Unified NSI** across multi-domain of TN.
  – **All is one of constraint criteria of the color template** (draft-ietf-spring-segment-routing-policy), and color template with **All provides a more flexible control**.
  – Uniform Color template (Centralized and distributed, intra and inter domain) for overlay service mapping to underlay resource.
  – **All meet the link requirements from 3GPP**. It is **independent** of the existing domain partition of the network, i.e., any intra- or inter-domain link, and it is also **independent** of the existing underlay frame or routing technologies (IGP, BGP, Segment Routing, Flex-E, etc.), i.e., any L2 or L3 link is the candidate resource.

• There is no modification to the forwarding table (dataplane).
All as a TN-slice Identifier

I. SR-policy@All installed
II. Flow steer to SR policy or SR-BE @All

SR policy@All-1
color 1000(red)
All IS 1
te metric

SR-BE@All-1
==
SR policy@All-1
color 10(black)
All IS 1
igp metric

Create the TN-slice
• Assign/Select the All to the slice.
• Allocate resources(vNode,vLink...) to All
• All information is advertised via Control plane.
All as a Set of TN-slice Resource Identifiers

- **L3 Interface Slice Isolation**
  - L3 Parameters
  - L3 parameter for slice-bundles1

- **L2 Interface Slice Isolation**
  - L2 Bundle members share the same IGP instance.
  - L2 Bundle members could be any interface type.
  - Control-plane packets will always be forwarded over the same path.
  - Data-plane packets will be forwarded on the specific L2-bundle member.

- **Resource Isolation**
  - SIDs are allocated per All, and the resource (such as bandwidth) is allocated to All.
  - All is one of constraint criteria of the Color Template (draft-ietf-spring-segment-routing-policy), and color template with All and other traditional criteria, such as bandwidth, delay, affinity, provide a more flexible control.
All for Multi-Domain Deployment

Option C: Colored BGP-LU without SDN

Option B Inter-domain

ASBR selects All-specific out-link according to uniform Color Template.

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All for Multi-Domain Deployment Cont.

- BGP-LS advertised link-state NLRI containing AII information.
- For the inter-domain link, BGP-LS can advertise DIRECT protocol type, or firstly put inter-domain interconnections to IGP instance, then always import data from IGP protocol source.
- Controller supports computation of E2E TE path based on TE-DB with AII attribute.
**Combined with SR Flex-algorithm**

**Scenario 1:**
For inter-AS case, SDN controller can create VN for All-AS based on All, and VN for FA-AS based on FA respectively. SDN controller computes E2E segment lists, each containing multiple ASes and based on different technologies.

**Scenario 2:**
For a single All-AS, we can continue to apply SR FA to optimize label stack depth. In this case, a new criteria All is added in FAD, same as adding All to Color Template.
Next Step

• Comments welcome.

Thanks!