BIER Use Case in NVO3

draft-wang-bier-vxlan-use-case-01

Linda Wang (Presenting)
Sandy. Zhang & F. Hu
Background

• Motivated by draft-ietf-bier-use-cases, in section 3.6, it proposes there are many advantages introducing BIER in Data Center Virtualization.

• proposes solutions how to extend protocol to take advantage of BIER in Data Center Virtualization.

• Until now, received several precious comments.
The Problem

• In data center virtualization, there are two most common solutions to forward BUM traffic on the overlay network:
  – Ingress Replication: However, it doesn’t provide the optimal forwarding of multicast packets.
  – Enable the multicast capability in the underlay, such as PIM-SM or PIM-BIDIR and so on. However, it requires data centers to run multicast protocol and maintain multicast state in all the edge nodes and intermediate nodes.

• Proposed EVPN solution
  – Mapping the VXLAN VNI or NVGRE VSID to an EVI
  – Advertising inclusive Multicast Ethernet Tag routes to carry the VNI/VSID field through EVPN control plane
  – Advertising BGP Encapsulation extended community to carry the specific data plane encapsulation for the BUM traffic, such as VXLAN/NVGRE/MPLS/MPLS in GRE/VXLAN GPE and so on.
  – However, it requires NVE/VTEP to run EVPN
The Solution

• Introducing BIER at the transport layer in Data Center Virtualization

• Furthermore, introducing MLD as control plane to construct the overlay mapping.
  – Providing the optimal forwarding of multicast packets
  – Doesn’t require the data centers to run multicast protocol and maintain multicast state in the intermediate nodes
  – Doesn’t require the data centers to run EVPN
The Sketch of this Solution

- Specifically, using MLD as an overlay control plane to collect the VTEP/NVE belonging to the same VNI/VSID (like constructing I-PMSI tunnel), through carrying VNI/VSID information in the MLD extension.

<table>
<thead>
<tr>
<th>VNI</th>
<th>Bitmask</th>
<th>...</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>01110</td>
<td>...</td>
</tr>
<tr>
<td>30</td>
<td>10000</td>
<td>...</td>
</tr>
</tbody>
</table>

[I-BIFT]
The Sketch of this Solution

Then, using MLD as an overlay control plane as well to collect the VTEP/NVE attaching to the same tenant who join the same multicast group (like constructing S-PMSI tunnel), through carrying \(<S,G>\) information in the MLD extension.
The Sketch of this Solution

✓ Using the \(<S,G>\) information in the multicast traffic to lookup S-BIFT, encapsulating the multicast traffic with the Bitmask in the table, and forwarding the multicast traffic using BIER forwarding.

S-BIFT:

<table>
<thead>
<tr>
<th>(&lt;S,G&gt;)</th>
<th>VNI</th>
<th>Bitmask</th>
<th>...</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>00110</td>
<td>...</td>
<td></td>
</tr>
</tbody>
</table>
MLD extension

- The main idea:
  - Each NVE advertises **Virtual Network Identifier** information with BIER information to other NVEs through MLD, including VXLAN network identifier, VSID and so on.

```
+-----------------------------+-----------------------------+-----------------------------+-----------------------------+-----------------------------+
| Type | Length | Proto Type | Res | Virtual Network Identifier |
+-----------------------------+-----------------------------+-----------------------------+-----------------------------+-----------------------------+
```

Virtual Network Identifier Info sub-sub-TLV
More comments are welcome!

Thank you!