Potential uses of TRILL/LISP mechanisms for an NVE<->NVA Interface

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TRILL Directory & LISP Mapping System
Applicability to NVO3

- TRILL: L2 in TRILL
- LISP: L3 in IP
- NVO3: L2 in IP; L3 in IP
- Goal: Resolve Egress edge addresses
Various ways of Directories (NVAs) connecting to Edge nodes (NVEs)

**Locations:**
- Embedded in routers/switches in the core, or as standalone servers attached to them.
- Standalone servers or VMs connected to Edges via the client side port

**Contents:**
- Each Directory has mapping for a subset of VNs
- multiple Directories have mapping entries for a VN
Pull Model Used by LISP and TRILL

- **LISP**: Map-Request/Map-Reply/Map-Register/Map-Notify
  - Requests are sent to Map-Resolver (Portal to Mapping system)
    - Map-Resolver has to find the Map-Server(s) which are responsible for the block of address space
    - Map-Requests are then sent to the appropriate Map-Server via LISP-DDT, which forward it to registered ETRs
  - The messages are encapsulated in a LISP control message called a "Encapsulated Control Message".

- **TRILL**: request/reply
  - Requests can be sent to any of the valid directories
  - TRILL directory 100% depends on other authoritative sources. Therefore, doesn’t need mechanism to get input from Edge nodes
  - use Rbridge Channel syntax for those messages.

- **Pull Request** Triggered by:
  - An edge node (NVE) receives an ingress data frame with a destination whose attached edge (NVE) is unknown, or
  - The edge node (NVE) receives an ingress ARP/ND request for a target whose link address (MAC) or attached edge (NVE) is unknown.
PULL Responses by TRILL/LISP

• When the mapping entry is available in the Directory/MappingSystem
  – Valid Response (TRILL/LISP)

• When the mapping is not available:
  – LISP: policy to ITR: “native-forward”, or “drop”
  – TRILL: policy to Edge: “drop” or “native-forward” (i.e. flooding)

• TRILL extra:
  – cache timer
Push Model

- **Only in TRILL. LISP is PULL only**
- **Push:**
  - Directory servers (NVAs) pushed VN scoped entries to Edges.
- **Incremental Push Service Update**
  - Achieved by Link State Update to distribute the incremental updates.
- **Requesting Push Service:**
  - Push Directory servers (NVAs) (or the Edge by which they are attached) use VN scoped reliable Link State flooding to announce their availability to push mapping information.
  - Edge nodes use VN scoped reliable Link State flooding to announce all the Virtual Networks in which they are participating.
- **Policies:** When ingress edge can’t find entries for the incoming data frame:
  - simply drop the data frame,
  - flood it to all other edges that are in the same VN, or
  - start the “pull” process to get information from Pull Directory Server(s) (or NVA)
Push-Pull Hybrid Model

- Specific to TRILL
- Push model are used for some VNs, and pull model are used for other VNs.
  - It can be operator’s decision (i.e. by configuration) on which VNs’ mapping entries are pushed down from directory (e.g. frequently used) and which VNs’ mapping entries are pulled (e.g. rarely used).
  - Useful for Gateway nodes where great number of VNs are enabled.
- Or, a portion of hosts in a VN is pushed, other portion has to be pulled.
## Comparison Summary

<table>
<thead>
<tr>
<th></th>
<th>Types of Content</th>
<th>Content Source</th>
<th>Push /Pull?</th>
<th>Incremental Update</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRILL Directory</td>
<td>• Inner-outer mapping for target in the same virtual network as the Source.</td>
<td>100% from authoritative system (e.g. VM orchestration)</td>
<td>Per VN based Push Pull, or combination</td>
<td>Yes</td>
</tr>
<tr>
<td>LISP MappingSys</td>
<td>• Inner-outer mapping for targets in any Virtual Networks</td>
<td>100% populated via control plane</td>
<td>Pull only</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
| NVO3’ NVA       | **When attached VNs are L2:**  
                  - Inner-outer mapping for target in the same VN as Source  
                  **When the attached VNs are L3:**  
                  - Inner-outer mapping for targets in any Virtual Networks  
                  • Gateway’s forwarding table for inter-subnet (or inter-VN) communication  
                  • Potentially the Inter-VN communication policies (??) | coming from authoritative systems  
                  But also allow NVEs to announce their directly attached TSes. (conflict?) | Push, Pull, Hybrid | ???               |