Design space of computing metric distribution

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Recap of the CATS framework

• Core functional components:
  • C-SMA: CATS Service Metric Agent
  • C-PS: CATS Path Selector

• SMA collect the computing metric and distribute it to PS to make optimal path decision.

• Design choice regarding:
  • How to collect
  • How to distribute
2x2 matrix of the design space

- Two ways of collecting computing metric
  - Centralized: by a cloud monitor
  - Distributed: by CATS egress router

- Two ways of distributing computing metric
  - Centralized: by network controller: calculate the path based on metric and distribute the result to ingress router
  - Distributed: each ingress router receive the computing metric and calculate the path by themselves.

<table>
<thead>
<tr>
<th>Metric distribution</th>
<th>Centralized C-SMA</th>
<th>Distributed C-SMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralized C-PS</td>
<td>Cloud monitor -&gt; Controller</td>
<td>Egress -&gt; Controller</td>
</tr>
<tr>
<td>Distributed C-PS</td>
<td>Cloud monitor -&gt; Controller -&gt; Ingress</td>
<td>Egress -&gt; Controller -&gt; Ingress</td>
</tr>
</tbody>
</table>
Example of centralized C-SMA +

- Option 1: Centralized C-PS
  - Network controller calculates the path
  - No protocol extension needed

- Option 2: Distributed C-PS
  - Network controller only pass the metric to Ingress (may involve pre-process)
  - Southbound protocol extension to distribute the metric
Example of distributed C-SMA +

• Option 3: Centralized C-PS
  • Network controller calculate the path
  • Southbound protocol extension to collect the metric. E.g. BGP-LS

• Option 4: Distributed C-PS
  • Network controller only reflect the Metric (may involve pre-processing)
  • Southbound protocol extension to distribute the metric. E.g. BGP, BGP-LS, BGP flowspec
## Initial Comparison

<table>
<thead>
<tr>
<th>Protocol extension choice</th>
<th>Centralized C-SMA + Centralized C-PS</th>
<th>Centralized C-SMA + Distributed C-PS</th>
<th>Distributed C-SMA + Centralized C-PS</th>
<th>Distributed C-SMA + Distributed C-PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol extension choice</td>
<td>None</td>
<td>BGP flowspec</td>
<td>BGP-LS</td>
<td>BGP/BGP-LS, BGP flowspec</td>
</tr>
<tr>
<td>CATS router performance requirement</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Network controller performance requirement</td>
<td>High</td>
<td>Low</td>
<td>High</td>
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</tr>
</tbody>
</table>

- Comments and Questions?
- Co-author/collaborator?