Problem Statement and Requirements of end-to-end CATS

draft-yuan-cats-end-to-end-problem-requirement-01

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Use case of distributed ubiquitous instances

Light Load | Heavy Load | Normal load
+---------+----------+---------
| Edge    | Edge     | Edge    |
| Site 1  | Site 2   | Site 3  |
+---------+----------+---------
computing | computing | computing|
| delay(4ms) | delay(10ms) | delay(5ms) |
+---------+----------+---------
| Egress  | Egress   | Egress  |
| Router 1| Router 2 | Router 3 |
+---------+----------+---------
newtork | newtork | newtork |
| delay(0ms) | delay(4ms) | delay(5ms) |
+---------+----------+---------
| Infrastructure |
+---------+---------

Client delay = 1.5 + 7.9 = 9.4 ms

Computing-Aware Traffic Steering (CATS)
Problem Statement, Use Cases, and Requirements
draft-ietf-cats-usecases-requirements-01

large amount of ubiquitous service instances
Problem 1. **Large amount of dynamic entries** are required to be recorded and maintained in the control plane for CATS routers.
Problem 2. **Quick updates** for optimal service instance selection.
Sample and Distribute

2) Distribute
1) Aggregate

Instance 1: Computing Delay
Instance 2: Computing Delay
Instance 3: Computing Delay
Instance 4: Computing Delay

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Best/Average/... Performance as the representative of a CATS Router
CATS Router
Best/Average/... Computing Delay
## Requirements for CATS Network

R8: MUST provide mechanisms for metric collection.
R9: MUST provide mechanisms to distribute the metrics.
R10: MUST realize means for **rate control** for distributing of metrics.

### Values and advantages

- **Reduce** the entries collected, stored and maintained in the control plane.
- **Decline** the frequency of entry updates and damp service route recalculations.

### Table: Entries comparison

<table>
<thead>
<tr>
<th>Entries in the control plane (Service RIB)</th>
<th>Hierarchical</th>
<th>Non-hierarchical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local instances and global PEs with paths</td>
<td>All instances with paths</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entries in the forwarding plane (Service FIB)</th>
<th>Hierarchical</th>
<th>Non-hierarchical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single 'best' entry or multiple equal entries</td>
<td>Single 'best' entry or multiple equal entries</td>
<td></td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Frequency of updates of Service FIB</th>
<th>Hierarchical</th>
<th>Non-hierarchical</th>
</tr>
</thead>
<tbody>
<tr>
<td>When a relatively stable choice among PEs updates or local updates happen</td>
<td>When a choice among all possible instances updates</td>
<td></td>
</tr>
</tbody>
</table>

R: SHOULD provide mechanisms to aggregate service metrics for distribution.
Next Steps

- Refine the drafts upon comments and suggestions.
- More comments, suggestions and contributions would be welcome.