Advertising SaaS Path Performance Metric using BGP

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IETF 118
Background

- SDWAN tunnel is used to connect the branch and headquarter of the enterprise: IPSec over L3VPN Path.
- Enterprise are using more and more SaaS applications such as Office 365/Dropbox
- SaaS app is usually deployed in cloud for better scalability.

draft-ietf-idr-sdwan-edge-discovery-12
Same SaaS App, accessible from multiple sites

- SaaS app in the cloud can be accessed from multiple sites using different paths.
- For a user in site 1, multiple paths can be used to access the same SaaS app:
  1. Direct Internet Access to SaaS
  2. CPE1 – Tunnel – CPE2 – MPLS – SaaS
  3. CPE1 – Tunnel – CPE3 – MPLS – SaaS
  4. CPE1 – Tunnel – CPE3 – Internet – SaaS
- Problem: Which path is the best?
Proposal: Advertising Path Metric between SDWAN CPEs

- Each CPE measures the path performance metric to the SaaS app independently. E.g., CPE3 measures the RTT of access SaaS app through MPLS(path3-1) and internet (path 4-1), CPE 1 measure Path 1
- Advertise the result to other CPE through BGP
- Each CPE pick the path with highest quality, CPE 1 compare the path performance and pick the best one.

<table>
<thead>
<tr>
<th>App</th>
<th>Path</th>
<th>Delay</th>
<th>Loss</th>
<th>Jitter</th>
<th>Bandwidth</th>
<th>F QoS</th>
</tr>
</thead>
<tbody>
<tr>
<td>App 1</td>
<td>1</td>
<td>150</td>
<td>1</td>
<td>40</td>
<td>10</td>
<td>75</td>
</tr>
<tr>
<td>App 1</td>
<td>3-1</td>
<td>80</td>
<td>1</td>
<td>20</td>
<td>14</td>
<td>85</td>
</tr>
<tr>
<td>App 1</td>
<td>4-1</td>
<td>65</td>
<td>0</td>
<td>30</td>
<td>31</td>
<td>90</td>
</tr>
</tbody>
</table>
SaaS Path Performance Route (Key)

- **Key**: Identify a specific path to a specific SaaS application
- **New type of BGP SDWAN NLRI:**
  - **Path**
    - Site ID: Unique ID of SDWAN Site
    - Path Index type and value: indicate the path
      - Type 1: 4-byte Local index
      - Type 2: 3-byte MPLS Label
      - Type 3: 16-byte SRv6 SID
    - SD-WAN-Node-ID: Node's IPv4/v6 address
  - **App**
    - APP ID: SaaS Application ID. IP of a SaaS app may vary in different locations.
    - App Req: App requirement of path quality
      - 1: default
      - 2: Medium
      - 3: High

<table>
<thead>
<tr>
<th>Route Type = 2</th>
<th>2 octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>2 octets</td>
</tr>
<tr>
<td>Site ID</td>
<td>4 octets</td>
</tr>
<tr>
<td>APP ID</td>
<td>4 octets</td>
</tr>
<tr>
<td>APP Req</td>
<td>1 octet</td>
</tr>
<tr>
<td>Path Index Type</td>
<td>1 octet</td>
</tr>
<tr>
<td>Path Index Value</td>
<td>3 or 4 or 16 octets</td>
</tr>
<tr>
<td>SD-WAN-Node-ID</td>
<td>4 or 16 octets</td>
</tr>
</tbody>
</table>
SaaS Path Performance Metrics (Value)

• Metrics includes:
  • Delay, Loss, Jitter, Bandwidth
  • Path Status: 6 levels, Best/Good/Acceptable/Minor Issue/Bad Quality/Down
  • Path QoS: Aggregate value based on above metrics
• SaaS App name
• SaaS App domain name

• Two options of Encapsulation:
  • Metadata Path Attribute defined in draft-ietf-idr-5g-edge-service-metadata-12
  • Tunnel Encapsulation Attribute
Discussion about APP ID

• IP address and domain name can not identify an SaaS app uniquely because:
  • IP of an SaaS app varies based on locations
  • Domain name is reused by many different SaaS apps
• SaaS app name and domain name is still useful for ops and management though.
• Assigned by controller? Registry?
Feedback and comments are welcomed

- Thoughts on APP ID?
- What path metric is useful? Path metric combining function?
- Encapsulation: Metadata Path Attribute vs Tunnel Attribute
- Question and comments?