A YANG Model for VPN Service Performance Monitoring

draft-www-bess-yang-vpn-service-pm-01

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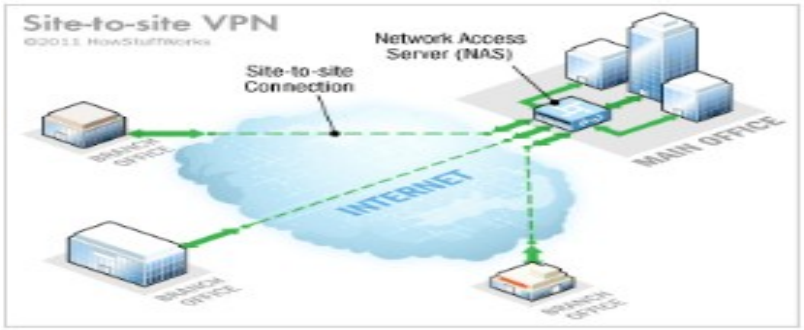
Recap

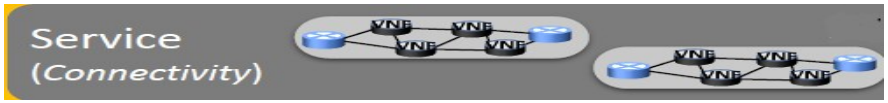
- Network performance measurement protocol and methodology for Ethernet traffic, IP traffic, MPLS traffic:
  - IP traffic performance measurement protocol such as OWAMP, TWAMP
  - IP traffic performance metric such as one way delay, roundtrip delay, loss, PDV
  - MPLS traffic performance measurement such as MPLS loss and delay measurement for MPLS[RFC6374], MPLS-TP loss and delay measurement[RFC6375]
  - Ethernet traffic performance measurement such as Y.1731

- None of these performance monitoring mechanism can be used to measure overlay level or tunnel level network performance

Two Typical Use Cases

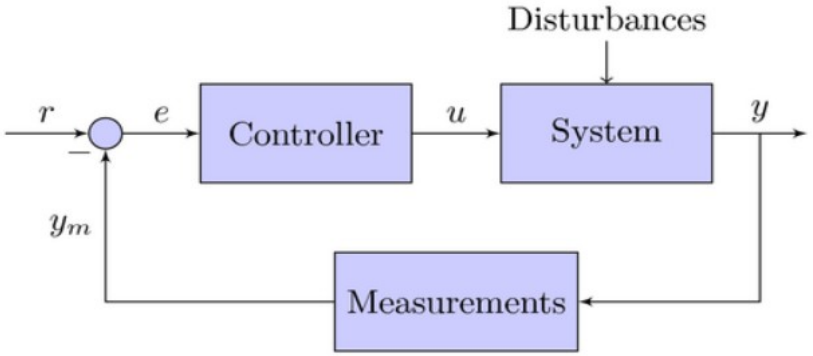
Case 1:VPN service performance monitoring





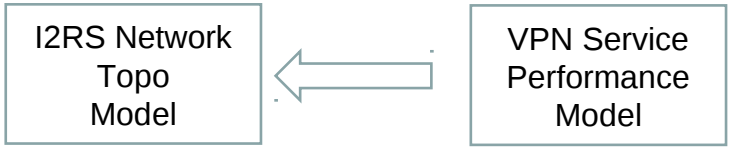
- One way delay between PE1 in site A and PE2 in Site2
- Packet loss between CE1 and PE1 in site A
- WAN link bandwidth between CE2 and PE2 within Site B

Case 2: Closed Loop Network optimization automation



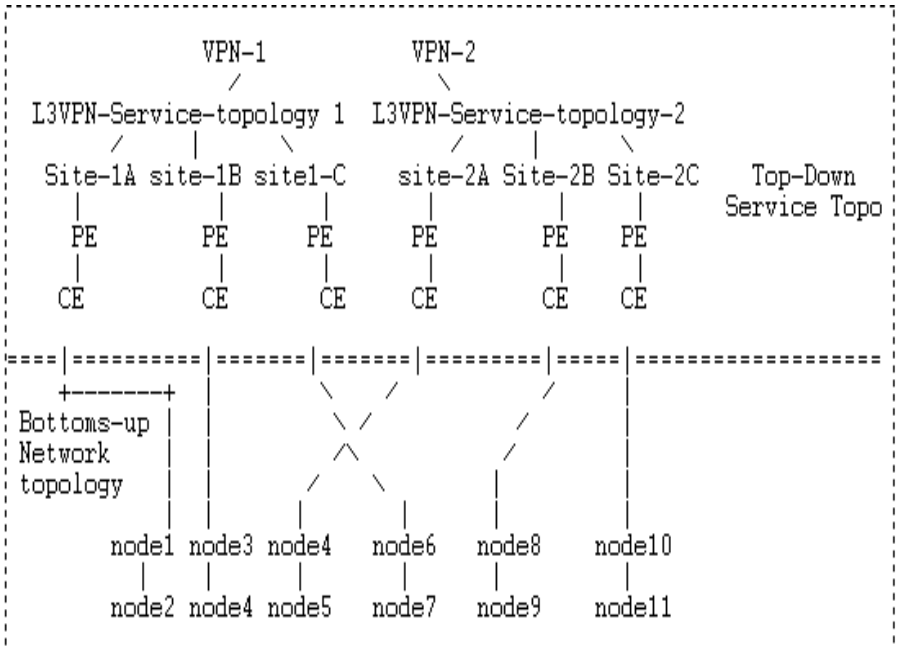
- Optimize network based on VPN service performance monitoring
  - E.g. increase bandwidth for tunnel between CE1 and PE1
  - Switch to the backcup tunnel in case of failure of primary tunnel

Model Design



- VPN Service Performance Model provide VPN level or overlay level performance monitoring
- Augment I2RS Network Topo model [RFC8345]
  - with service topology parameters at network level
  - With site role of service topology parameters at node level
  - With performance attribute at link level
- Establish the relationship between underlay topology and VPN service topology

Relationship between underlay topology and VPN service topology



- **Mapping between Overlay and Underaly:**
  - The Site-1,A,B,C are mapped to node (1,2), (3,4),(4,5)
  - while Site-2 A,B,C are mapped to node (6,7),(8,9)(10,11) in the underlying physical network.
- **VPN-svc 1:** supporting hub-spoke communication for Customer 1 with connecting the customers access at 3 sites.
- **VPN-svc 2:** supporting hub-spoke disjoint communication for Customer 2 with connecting the customers access at 3 sites

Performance measurement data source

- The performance monitoring data per link in the underlying network can be collected using network performance measurement method such as MPLS Loss and Delay Measurement [RFC6374]

- The performance monitoring data reflecting the quality of the VPN service such as end to end network performance data between VPN sites can be aggregated or calculated
  - using PCEP solution [RFC5440]
  - or LMAP solution [RFC8194] and

- The data can be fed into data source such as the management system or network devices.

- The measurement interval and report interval associated with these performance data usually depends on configuration parameters.

Performance Monitoring Data Retrieval

Retrieval via I2RS Pub/Sub

```
<rpc netconf:message-id="101"
    xmlns:netconf="urn:ietf:params:xml:ns:netconf:base:1.0">
    <establish-subscription
       xmlns="urn:ietf:params:xml:ns:yang:ietf-subscribed-notifications">
       <stream-subtree-filter>
          <networks xmlns="urn:ietf:params:xml:ns:yang:ietf-network-topo">
             <network>
              <network-id>vpn1</network-id>
               <node>
                <node-id>A</node-id>
                <node-type xmlns="urn:ietf:params:xml:ns:yang:ietf-svc-topo">pe</node-type>
               </node>
               <node>
                <node-id>B</node-id>
                <node-type xmlns="urn:ietf:params:xml:ns:yang:ietf-svc-topo">pe</node-type>
               </node>
               <link xmlns="urn:ietf:params:xml:ns:yang:ietf-network-topology">
                <link-id>A-B</link-id>
                <source>
                 <source-node>A</source-node>
                </source>
                <destination>
                 <dest-node>B</dest-node>
                </destination>
                 <svc-telemetry-attributes
                  xmlns="urn:ietf:params:xml:ns:yang:ietf-svc-topo">
                  <loss-statistics>
                   <packet-loss-count/>
                  </loss-statistics>
                 </svc-telemetry-attributes>
               </link>
             </network>
          </networks>
       </stream-subtree-filter>
       <period xmlns="urn:ietf:params:xml:ns:yang:ietf-yang-push:1.0">500</period>
    </establish-subscription>
</rpc>
```

- Use subscription model [I-D.ietf-netconf-yang-push] to subscribe to their interested VPN service performance data in the data source.

On demand Retrieval via RPC model

```
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0"
     message-id="1">
  <report xmlns="urn:ietf:params:xml:ns:yang:example-service-pm-report">
   <networks xmlns="urn:ietf:params:xml:ns:yang:ietf-network-topo">
    <network>
     <network-id>vpn1</network-id>
     <node>
         <node-id>A</node-id>
         <node-type xmlns="urn:ietf:params:xml:ns:yang:ietf-svc-topo">pe</node-type>
     </node>
     <node>
        <node-id>B</node-id>
        <node-type xmlns="urn:ietf:params:xml:ns:yang:ietf-svc-topo">pe</node-type>
     </node>
     <link-id>A-B</link-id>
        <source>
        <source-node>A</source-node>
        </source>
        <destination>
        <dest-node>B</dest-node>
         </destination>
         <svc-telemetry-attributes xmlns="urn:ietf:params:xml:ns:yang:ietf-svc-topo">
         <loss-statistics>
           <packet-loss-count/>
           </loss-statistics>
         </svc-telemetry-attributes>
     </link>
  </report>
</rpc>
```

- Use RPC model to fetch performance data on demand,e.g., the client requests packet-loss- count between PE1 in site 1 and PE2 in site 2 belonging to VPN1.

Way Forward

- Adoption?
  - The authors believe this draft has a good base for WG adoption