A YANG Model for VPN Service Performance Monitoring

draft-www-bess-yang-vpn-service-pm-04

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Background

- 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 as data source to measure VPN level or tunnel level network performance

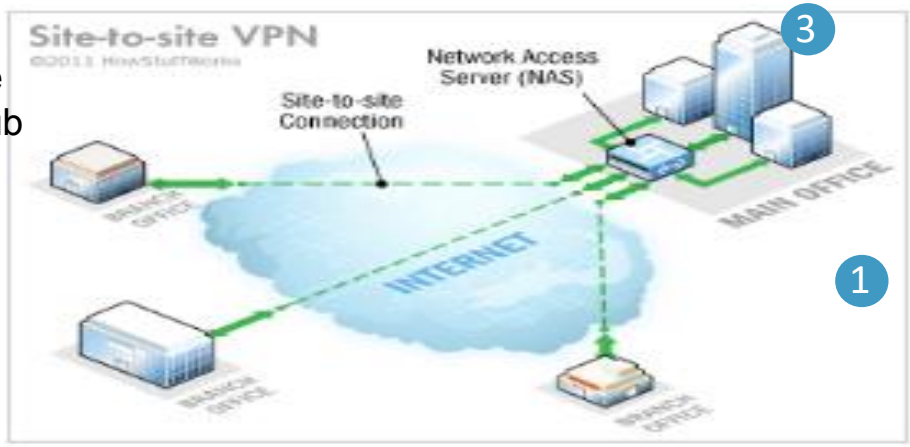
Recap

- This document defines a YANG model for
  - Network Performance Monitoring and VPN Service Performance Monitoring
  - It can be used to monitor and manage network performance on the topology at higher layer or the service topology between VPN sites.
- This draft was firstly discussed in IETF103 BESS meeting in Bangkok, there was agreement to proceed this work in BESS working group and listed it in Action Items (WG Adoption Call).

Real Time VPN Service Monitoring

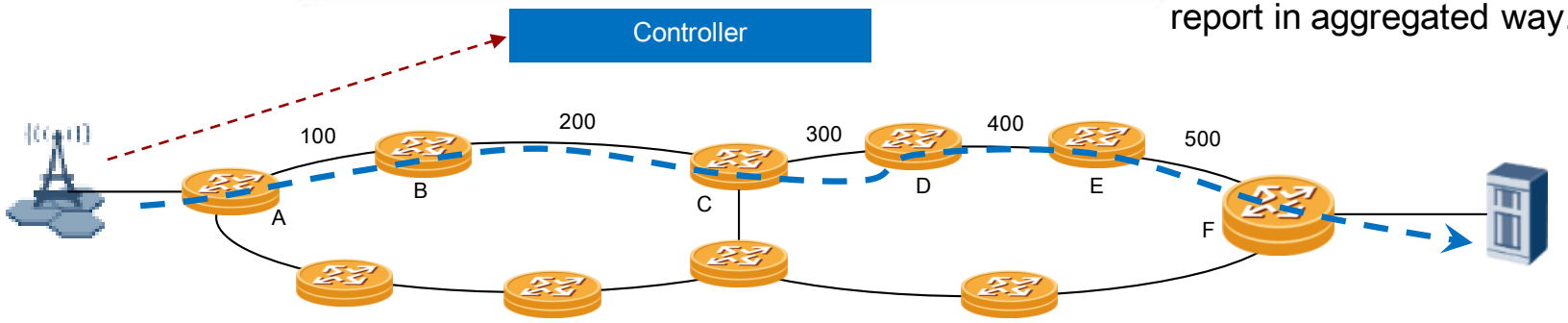
2 Monitor per tunnel network performance and report via pub/sub model or on demand RPC retrieval model

Node C
Node E
Link 500
VPN



3 Optimize network based on VPN service performance monitoring

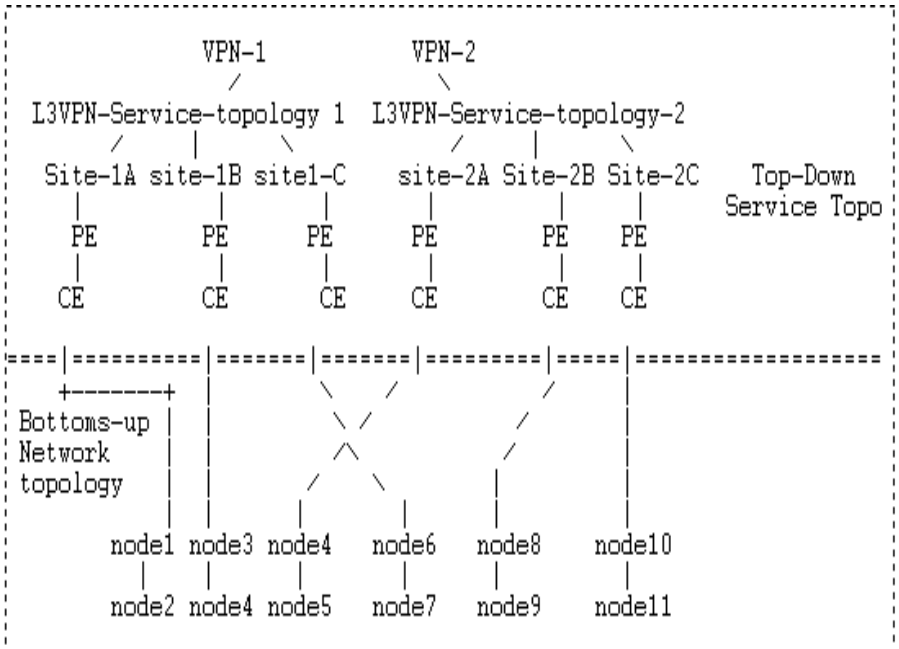
1 Measure per link network performance in the underlying network using MPLS loss and delay measurement method and report in aggregated way.



Key Elements:

- Augment Network Topo model [RFC8345] with service topo info at network level, site role info at node level and performance measurement info at link level
- Establish the relationship between underlay topology and VPN service topology and bind the VPN service to the tunnel (e.g., SR-TE tunnel)

Relationship between underlay topology and VPN service topology



- The Site-1A,1B,1C are mapped to node (1,2),(3,4),(6,7) while Site-2 A,2B,2C are mapped to node (3,4),(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 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.

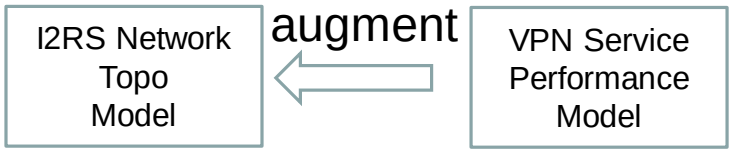
Open issue

- Should we add link-type to indicate various different tunnel technology, e.g, VXLAN, IP in IP,GRE,etc.
- It was brought up in I2RS mailing list and haven’t received feedback yet.
- We have added link type in v-04

Way Forward

- It has received sufficient support in IETF103 Bess session, and it is already in queue for adoption call.
- But BESS chairs haven’t decided it should be done in BESS.
- We think that it relate to network topology model defined in I2RS WG,
  - There are a few relevant drafts progressing in TEAS, e.g., transport network slicing model, ACTN VN telemetry autonomics model.
- Want to hear TEAS chairs’ advice.

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

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]
- and The performance monitoring information 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
- 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.