YANG models for ACTN TE Performance Monitoring Telemetry and Network Autonomics

draft-lee-teas-actn-pm-telemetry-autonomics-00

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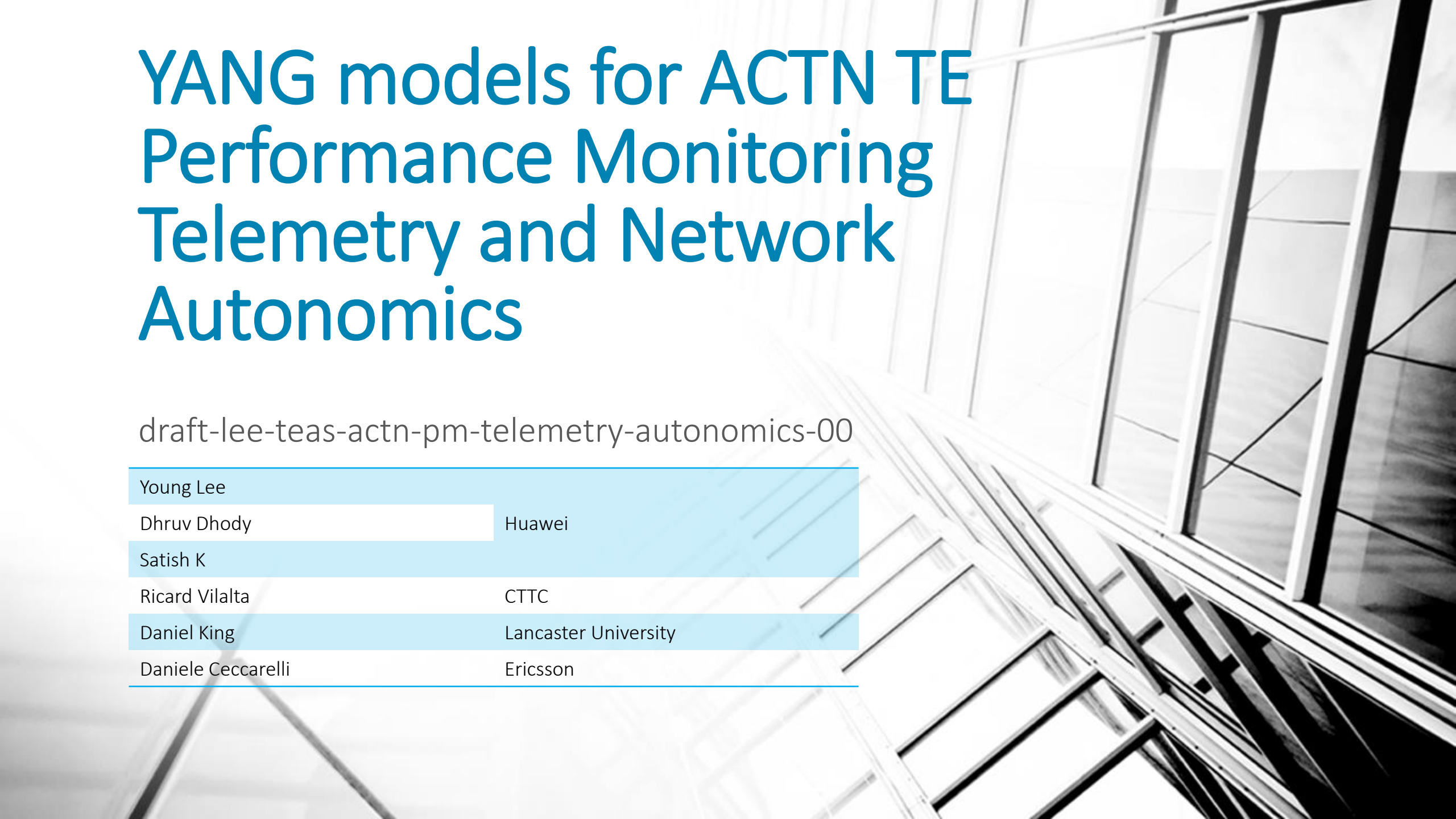
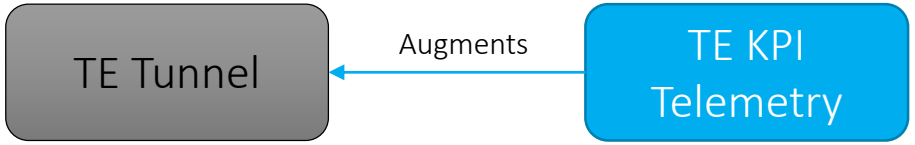


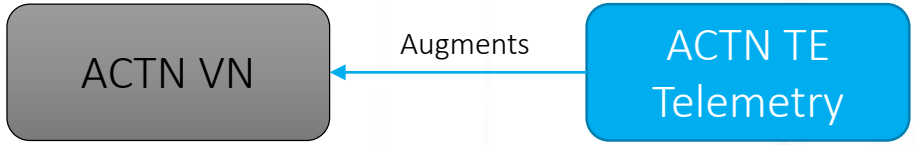
Introduction

- YANG data models that describe
  - Key Performance Indicator (KPI) telemetry
  - Network autonomics for TE-tunnels and ACTN VNs.
- [I-D.xu-actn-perf-dynamic-service-control-03]
  - Performance Monitoring
  - Dynamic control in ACTN – creation, modification, optimization etc.
  - Monitor Network Traffic, Detects traffic imbalance, Initiate optimization!
  - Measure customer SLA, take dynamic action to make sure you meet them at all times
  - Scalability of Performance data
- Support for
  - Performance telemetry data
  - Scaling Intent

Yang Model Relationships



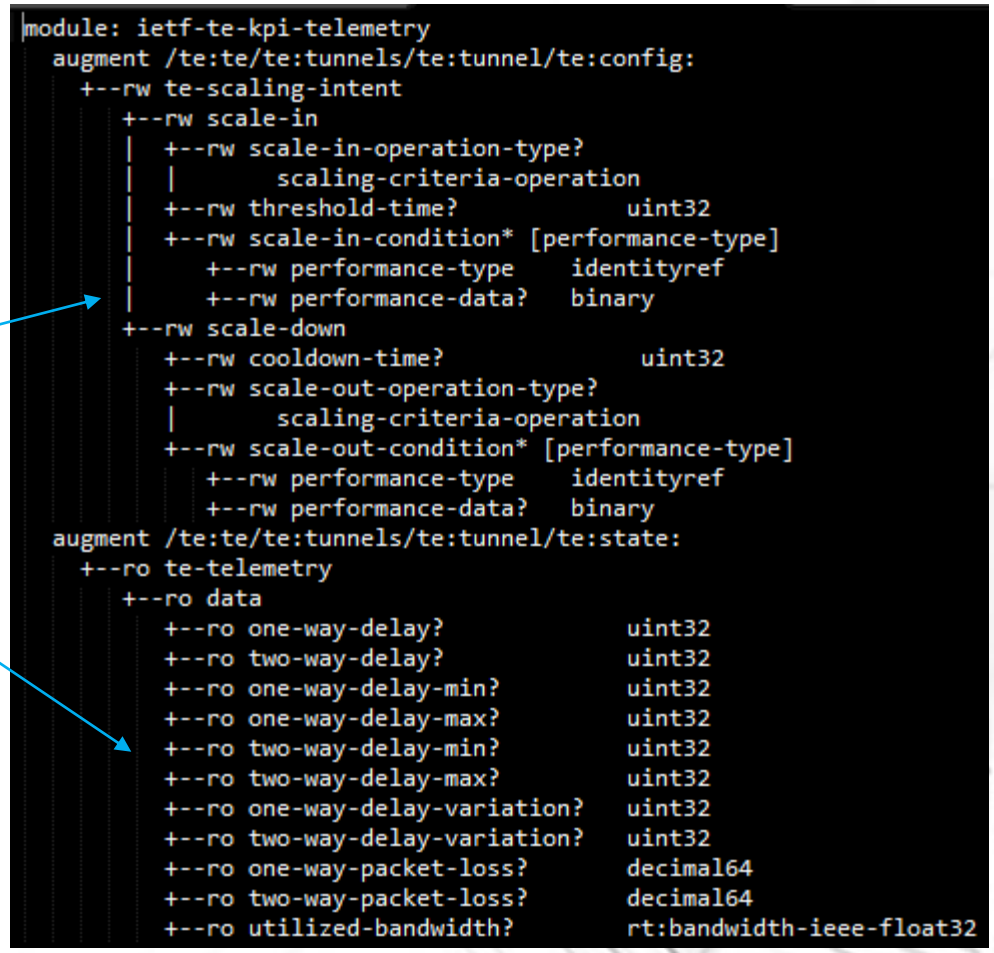
- TE KPI Telemetry model provides the TE tunnel level performance monitoring.
- Augment the TE tunnel State with performance attributes
  - Use the notification subscription mechanism to subscribe to telemetry (YANG PUSH)
- Scaling Intent configurations for auto scaling in/out based on the performance monitored attributes



- ACTN TE KPI Telemetry model provides the VN level aggregated performance monitoring.
- Augment the VN state as well as individual VN-member state with performance attributes.
  - Use notification subscription (YANG PUSH)
- Scaling Intent configurations at the VN level to reach to the monitored performance KPI
- Allow configuration of aggregation mechanism from the lower level telemetry details (max, mean etc.)
  - From VN-Member to VN
  - From per-domain tunnel to E2E VN-Member

TE KPI Telemetry Yang Model

- Telemetry Data
  - Delay, Delay-Variation, Packet-Loss, Bandwidth etc.
- Scaling Intent
  - Scale-In
  - Scale-Out
  - Conditions



ACTN TE Telemetry Yang Model

- VN Level
  - Telemetry Data
    - Delay, Delay-Variation, Packet-Loss, Bandwidth etc.
  - The aggregation grouping operation
    - Min, Max, Mean, Standard Deviation, Sum etc.
  - Scaling Intent
    - Scale-In
    - Scale-Out
    - Conditions

```
augment /actn-vn:actn-state/actn-vn:vn/actn-vn:vn-list:
  +--ro vn-telemetry
  |  +--ro grouping-op
  |  |  +--ro delay-op?                grouping-operation
  |  |  +--ro delay-variation-op?      grouping-operation
  |  |  +--ro packet-loss-op?          grouping-operation
  |  |  +--ro utilized-bandwidth-op?   grouping-operation
  |  +--ro data
  |     +--ro one-way-delay?              uint32
  |     +--ro two-way-delay?              uint32
  |     +--ro one-way-delay-min?          uint32
  |     +--ro one-way-delay-max?          uint32
  |     +--ro two-way-delay-min?          uint32
  |     +--ro two-way-delay-max?          uint32
  |     +--ro one-way-delay-variation?    uint32
  |     +--ro two-way-delay-variation?    uint32
  |     +--ro one-way-packet-loss?        decimal64
  |     +--ro two-way-packet-loss?        decimal64
  |     +--ro utilized-bandwidth?         rt:bandwidth-ieee-float32
  +--ro vn-scaling-intent
     +--ro scale-in
     |  +--ro scale-in-operation-type?
     |  |       scaling-criteria-operation
     |  +--ro threshold-time?             uint32
     |  +--ro scale-in-condition* [performance-type]
     |     +--ro performance-type    identityref
     |     +--ro performance-data?   binary
     +--ro scale-down
        +--ro cooldown-time?               uint32
        +--ro scale-out-operation-type?
        |       scaling-criteria-operation
        +--ro scale-out-condition* [performance-type]
           +--ro performance-type    identityref
           +--ro performance-data?   binary
```

ACTN TE Telemetry Yang Model

- VN-Member Level
  - Telemetry Data
    - Delay, Delay-Variation, Packet-Loss, Bandwidth etc.
  - The aggregation grouping operation
    - Min, Max, Mean, Standard Deviation, Sum etc.

```
augment /actn-vn:actn-state/actn-vn:vn/actn-vn:vn-list/actn-vn:vn-member-list:
  +--ro vn-telemetry
     +--ro grouping-op
     |  +--ro delay-op?                grouping-operation
     |  +--ro delay-variation-op?      grouping-operation
     |  +--ro packet-loss-op?          grouping-operation
     |  +--ro utilized-bandwidth-op?   grouping-operation
     +--ro data
        +--ro one-way-delay?             uint32
        +--ro two-way-delay?             uint32
        +--ro one-way-delay-min?         uint32
        +--ro one-way-delay-max?         uint32
        +--ro two-way-delay-min?         uint32
        +--ro two-way-delay-max?         uint32
        +--ro one-way-delay-variation?   uint32
        +--ro two-way-delay-variation?   uint32
        +--ro one-way-packet-loss?       decimal64
        +--ro two-way-packet-loss?       decimal64
        +--ro utilized-bandwidth?        rt:bandwidth-ieee-float32
```

ACTN TE Telemetry Yang Model

- VN-Level Configuration
  - Scaling
    - Scale-In, Scale-Out, Conditions
  - Grouping-Op
    - Min, Max, Mean, Standard Deviation, Sum etc.
- VN-Member Level Configuration
  - Grouping-Op
    - Min, Max, Mean, Standard Deviation, Sum etc.

```
module: ietf-actn-te-kpi-telemetry
  augment /actn-vn:actn/actn-vn:vn/actn-vn:vn-list:
    +--rw vn-telemetry
    |  +--rw grouping-op
    |     +--rw delay-op?                grouping-operation
    |     +--rw delay-variation-op?      grouping-operation
    |     +--rw packet-loss-op?          grouping-operation
    |     +--rw utilized-bandwidth-op?   grouping-operation
    +--rw vn-scaling-intent
       +--rw scale-in
       |  +--rw scale-in-operation-type?
       |  |       scaling-criteria-operation
       |  +--rw threshold-time?            uint32
       |  +--rw scale-in-condition* [performance-type]
       |     +--rw performance-type    identityref
       |     +--rw performance-data?   binary
       +--rw scale-down
          +--rw cooldown-time?             uint32
          +--rw scale-out-operation-type?
          |       scaling-criteria-operation
          +--rw scale-out-condition* [performance-type]
             +--rw performance-type    identityref
             +--rw performance-data?   binary
```

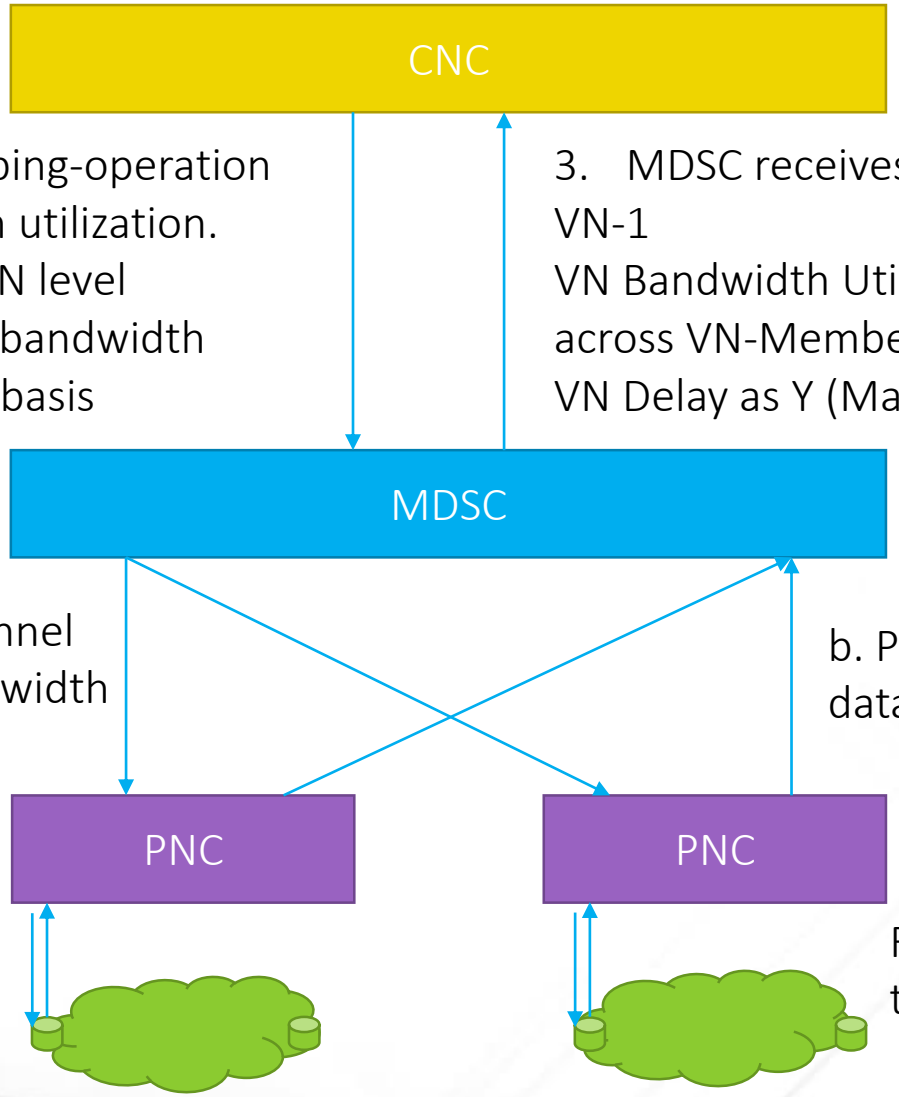
```
augment /actn-vn:actn/actn-vn:vn/actn-vn:vn-list/actn-vn:vn-member-list:
  +--rw vn-telemetry
     +--rw grouping-op
        +--rw delay-op?                grouping-operation
        +--rw delay-variation-op?      grouping-operation
        +--rw packet-loss-op?          grouping-operation
        +--rw utilized-bandwidth-op?   grouping-operation
```

Telemetry Subscription

- Via the Notification Subscription / Yang-Push mechanism
  - Subscribe notifications on a per client basis.
  - Specify sub-tree filters or xpath filters so that only interested contents will be sent.
  - Specify either periodic or on-demand notifications.

```
<netconf: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-yang-push:1.0">
          <filter netconf:type="subtree">
             <actn-state xmlns="urn:ietf:params:xml:ns:yang:ietf-actn-vn">
                <vn>
                   <vn-list>
                     <vn-id/>
                     <vn-name/>
                     <vn-telemetry xmlns="urn:ietf:params:xml:ns:yang:ietf-actn-te-kpi-telemetry">
                         <one-way-packet-loss/>
                         <utilized-bandwidth/>
                     </vn-telemetry >
                   </vn-list>
                </vn>
             </actn-state>
          </filter>
          <period>500</period>
       </establish-subscription>
    </netconf:rpc>
```

Interactions



1. CNC configure the grouping-operation for delay and bandwidth utilization.
2. CNC subscribes to the VN level telemetry for delay and bandwidth utilization on a periodic basis

3. MDSC receives the VN telemetry data
VN-1
VN Bandwidth Utilization as X (Minimum across VN-Members)
VN Delay as Y (Maximum across VN-Members)

a. MDSC subscribe for the tunnel telemetry for delay and bandwidth utilization on a periodic basis

b. PNC provides the tunnel telemetry data for the tunnels

Recursively applied at the device level

Next Steps

- Is this Yang Model useful?
- Should we have telemetry and scaling in the same model?
- Continue to enhance the model…
- Comments welcome!


THANK YOU!