

# YANG models for ACTN TE Performance Monitoring Telemetry and Network Autonomics

draft-lee-teas-actn-pm-telemetry-autonomics-05

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# Overview

- YANG data models that support
  - Performance Monitoring (PN) Telemetry for Tunnel and VN level
  - Network autonomies for Scaling Intent (for TE-tunnels and ACTN VNs.)
  - ACTN CMI Model – Customer-Driven Model
- [ACTN-Requirements] provides the operator's requirements for VNS Performance Monitoring (Req. #7):

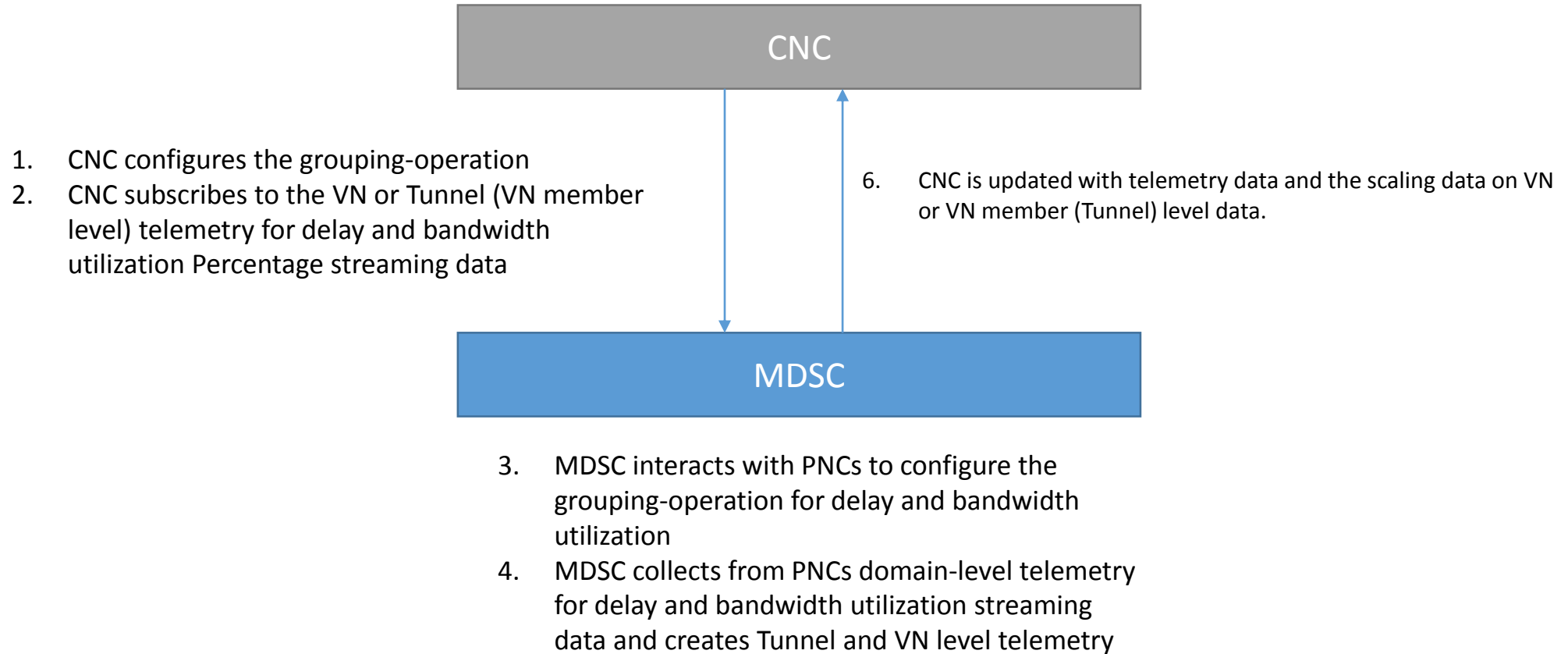
*The customer MUST be able to define performance monitoring parameters and its associated policy such as frequency of report, abstraction/aggregation level of performance data (e.g., VN level, tunnel level, etc.) with dynamic feedback loop from the network.*

- Use-case: [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

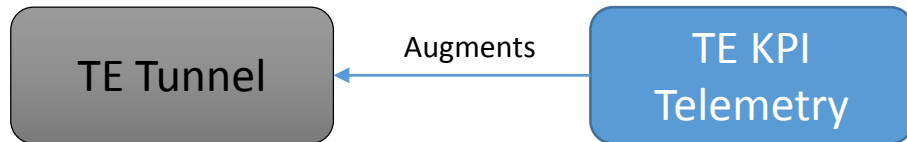
# Updates for this version (03)

- A new PM data added
  - Utilized Percentage to indicate Tunnel/VN level bandwidth-utilization-percentage.
- NMDA Compliancy Status
  - letf-te-kpi-telemetry
  - letf-actn-te-kpi-telemetry

# Interactions

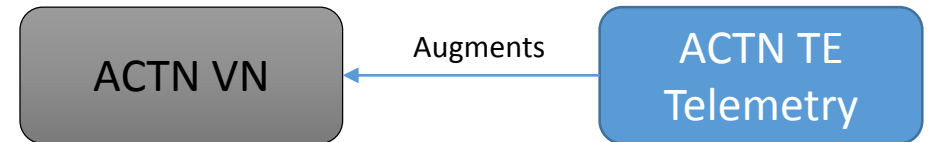


# Yang Model Relationships



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

Enable auto-scaling by configuring the condition when to scale out or in automatically!



- 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

# VN Telemetry Params Grouping

- Problem:
  - How to group telemetry params for VNs?
    - E.g., How to define VN latency, bandwidth,...?
- Proposed solution:
  - Augment vn-list with telemetry-grouping-op:
    - Provide a grouping-operation for each telemetry-param-type
    - Examples:
      - utilized-bandwidth-op = MAXIMUM (default)
      - delay-op = MAXIMUM (default)

# Scaling Intent Example

- It allows for grouping operation of various PM data and (re-)act accordingly
- Scale in/down of TE and VN
- Includes:
  - A list of params to monitor (scaling-criteria)
  - Logical operation to be applied to the monitored params
  - Hysteresis timers (threshold-time and cooldown-time)
- Example:
  - (VN two-way-delay > 50ms) AND (VN two-way-packet-loss > 1%) → Triggers VN Scale In

# YANG model: ietf-te-kpi-telemetry

```
module: ietf-te-kpi-telemetry
  augment /te:te/te:tunnels/te:tunnel/te:state:
    +--ro te-telemetry
      +--ro id? string
      +--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 utilized-percentage? decimal64
      +--ro te-ref? ->
/te:te/tunnels/tunnel/name
```

```
augment /te:te/te:tunnels/te:tunnel:
  +--rw te-scaling-intent
    +--rw scale-in-intent
      | +--rw threshold-time? uint32
      | +--rw cooldown-time? uint32
      | +--rw scale-in-operation-type? scaling-criteria-
operation
      | +--rw scale-out-operation-type? scaling-criteria-
operation
      | +--rw scaling-condition* [performance-type]
      | +--rw performance-type identityref
      | +--rw te-telemetry-tunnel-ref? ->
/te:te/tunnels/tunnel/name
    +--rw scale-out-intent
      +--rw threshold-time? uint32
      +--rw cooldown-time? uint32
      +--rw scale-in-operation-type? scaling-criteria-
operation
      +--rw scale-out-operation-type? scaling-criteria-
operation
      +--rw scaling-condition* [performance-type]
      +--rw performance-type identityref
      +--rw te-telemetry-tunnel-ref? ->
/te:te/tunnels/tunnel/name
```



# YANG model: ietf-actn-te-kpi-telemetry

```
module: ietf-actn-te-kpi-telemetry
  augment /actn-vn:actn-state/actn-vn:vn/actn-vn:vn-list:
    +--ro vn-telemetry
      +--ro id? string
      +--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 te-ref? ->
/te:te/tunnels/tunnel/name
      +--ro vn-ref? -> /actn-vn:actn/vn/vn-
list/vn-id
      +--ro vn-member-ref? -> /actn-vn:actn/vn/vn-
list/vn-member-list/vn-member-id
      +--ro te-grouped-params* ->
/te:te/tunnels/tunnel/state/te-kpi:te-telemetry/id
      +--ro vn-grouped-params* -> /actn-vn:actn-
state/vn/vn-list/vn-member-list/vn-telemetry/id
      +--ro grouping-operation? grouping-operation
```

```
augment /actn-vn:actn-state/actn-vn:vn/actn-vn:vn-list/actn-vn:vn-member-
list:
  +--ro vn-telemetry
    +--ro id? string
    +--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 te-ref? -> /te:te/tunnels/tunnel/name
    +--ro vn-ref? -> /actn-vn:actn/vn/vn-list/vn-id
    +--ro vn-member-ref? -> /actn-vn:actn/vn/vn-list/vn-
member-list/vn-member-id
    +--ro te-grouped-params* ->
/te:te/tunnels/tunnel/state/te-kpi:te-telemetry/id
    +--ro vn-grouped-params* -> /actn-vn:actn-state/vn/vn-
list/vn-member-list/vn-telemetry/id
    +--ro grouping-operation? grouping-operation
  augment /actn-vn:actn/actn-vn:vn/actn-vn:vn-list:
    +--rw vn-scaling-intent
      +--rw scale-in-intent
        | +--rw threshold-time? uint32
        | +--rw cooldown-time? uint32
        | +--rw scale-in-operation-type? scaling-criteria-operation
        | +--rw scale-out-operation-type? scaling-criteria-operation
        | +--rw scaling-condition* [performance-type]
        |   +--rw performance-type identityref
        |   +--rw te-telemetry-tunnel-ref? ->
/te:te/tunnels/tunnel/name
      +--rw scale-out-intent
        +--rw threshold-time? uint32
        +--rw cooldown-time? uint32
        +--rw scale-in-operation-type? scaling-criteria-operation
        +--rw scale-out-operation-type? scaling-criteria-operation
        +--rw scaling-condition* [performance-type]
        +--rw performance-type identityref
        +--rw te-telemetry-tunnel-ref? ->
/te:te/tunnels/tunnel/name
```

# Next Steps

- This draft provides Customer-initiated PM telemetry and Network Automatics on the CMI of ACTN architecture.
- The authors believe this draft has a good base for WG adoption 😊

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THANK YOU!

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