

YANG models for ACTN TE Performance Monitoring Telemetry and Network Autonomics

draft-lee-teas-actn-pm-telemetry-autonomics-07

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Overview

- YANG data models that support
 - Performance Monitoring (PM) Telemetry for Tunnel and ACTN VN level respectively:
 - ietf-te-kpi-telemetry
 - ietf-actn-te-kpi-telemetry
 - Network autonomies for Scaling Intent (for TE-tunnels and ACTN VNs.)
 - i.e. setting the exact condition when the tunnel or VN should be scaled in/out
 - and the performance parameter on which scaling should be done!
 - ACTN CMI Model – Customer-Driven Model for ACTN VN and ACTN MPI Model for TE-tunnel
- 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

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 combination of the performance monitored attributes

Example:

(one-way-delay > 50ms) AND (one-way-packet-loss > 1%)

-> Triggers TE Scale In

- 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

Status

- Presented in IETF 100.
- One major comment was: augment/re-use existing grouping(s) for performance data.
- This version made that change:
 - Basically imported TE-Types and uses the grouping defined in TE-types: *performance-metric-attributes* where uni-directional PM are defined for link and applied them to be used for connections (tunnels).
 - Added bi-directional performance monitoring data for connections (tunnels) in the module *ietf-te-kpi-telemetry* defined in this draft to give a full list of PM data.

Changes in the YANG module ietf-te-kpi-telemetry

```
augment "/te:te/te:tunnels/te:tunnel" {
  container te-telemetry {
    config false;
    description
      "telemetry params";
    leaf id {
      type string;
      description "Id of telemetry param";
    }
    uses te-types:performance-metric-attributes;
    /* all unidirectional PM data is defined in this grouping */
    uses bidirectional-telemetry-data;
    /* all bidirectional PM data is defined in this grouping */
    leaf te-ref {
      type leafref { path '/te:te/te:tunnels/te:tunnel/te:name';
    }
    description "Reference to measured te tunnel";
  }
}
```

Re-uses a grouping defined in te-types
for uni-directional PM data

Define a grouping in this module
for bi-directional PM data

Changes in the YANG module ietf-actn-te-kpi-telemetry

```
augment "/vn:actn/vn:vn/vn:vn-list/vn:vn-member-list" {  
  description  
    "Augmentation parameters for state TE vn member topologies."  
    topologies."  
  container vn-telemetry {  
    config false;  
    description  
      "VN member telemetry params";  
    uses te-types:performance-metric-attributes;  
    uses te-kpi:bidirectional-telemetry-data;  
    uses vn-telemetry-param;  
  }  
}
```

Re-uses a grouping defined in te-types
for uni-directional PM data

Re-uses a grouping defined in te-kpi
for bi-directional PM data

ietf-te-kpi-telemetry

```
module: ietf-te-kpi-telemetry
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
+--ro te-telemetry
  +--ro id?                          string
  +--ro unidirectional-delay?         uint32
  +--ro unidirectional-min-delay?     uint32
  +--ro unidirectional-max-delay?     uint32
  +--ro unidirectional-delay-variation? uint32
  +--ro unidirectional-packet-loss?   decimal64
  +--ro unidirectional-residual-bandwidth? rt-types:bandwidth-ieee-float32
  +--ro unidirectional-available-bandwidth? rt-types:bandwidth-ieee-float32
  +--ro unidirectional-utilized-bandwidth? rt-types:bandwidth-ieee-float32
  +--ro bidirectional-delay?          uint32
  +--ro bidirectional-min-delay?      uint32
  +--ro bidirectional-max-delay?      uint32
  +--ro bidirectional-delay-variation? uint32
  +--ro bidirectional-packet-loss?    decimal64
  +--ro bidirectional-residual-bandwidth? rt-types:bandwidth-ieee-float32
  +--ro bidirectional-available-bandwidth? rt-types:bandwidth-ieee-float32
  +--ro bidirectional-utilized-bandwidth? rt-types:bandwidth-ieee-float32
  +--ro utilized-percentage?          uint8
  +--ro te-ref?                       -> /te:te/tunnels/tunnel/name
```

ietf-actn-te-kpi-telemetry

```
module: ietf-actn-te-kpi-telemetry
augment /vn:actn/vn:vn/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
+--ro vn-telemetry
  +--ro unidirectional-delay?         uint32
  +--ro unidirectional-min-delay?     uint32
  +--ro unidirectional-max-delay?     uint32
  +--ro unidirectional-delay-variation? uint32
  +--ro unidirectional-packet-loss?   decimal64
  +--ro unidirectional-residual-bandwidth? rt-types:bandwidth-ieee-float32
  +--ro unidirectional-available-bandwidth? rt-types:bandwidth-ieee-float32
  +--ro unidirectional-utilized-bandwidth? rt-types:bandwidth-ieee-float32
  +--ro bidirectional-delay?          uint32
  +--ro bidirectional-min-delay?      uint32
  +--ro bidirectional-max-delay?      uint32
  +--ro bidirectional-delay-variation? uint32
  +--ro bidirectional-packet-loss?    decimal64
  +--ro bidirectional-residual-bandwidth? rt-types:bandwidth-ieee-float32
  +--ro bidirectional-available-bandwidth? rt-types:bandwidth-ieee-float32
  +--ro bidirectional-utilized-bandwidth? rt-types:bandwidth-ieee-float32
  +--ro utilized-percentage?          uint8
  +--ro grouping-operation?           grouping-operation
augment /vn:actn/vn:vn/vn:vn-list/vn:vn-member-list:
  +--ro vn-member-telemetry
  | +--ro unidirectional-delay?         uint32
  | +--ro unidirectional-min-delay?     uint32
  | +--ro unidirectional-max-delay?     uint32
  | +--ro unidirectional-delay-variation? uint32
  | +--ro unidirectional-packet-loss?   decimal64
  | +--ro unidirectional-residual-bandwidth? rt-types:bandwidth-ieee-float32
  | +--ro unidirectional-available-bandwidth? rt-types:bandwidth-ieee-float32
  | +--ro unidirectional-utilized-bandwidth? rt-types:bandwidth-ieee-float32
  | +--ro bidirectional-delay?          uint32
  | +--ro bidirectional-min-delay?      uint32
  | +--ro bidirectional-max-delay?      uint32
  | +--ro bidirectional-delay-variation? uint32
  | +--ro bidirectional-packet-loss?    decimal64
  | +--ro bidirectional-residual-bandwidth? rt-types:bandwidth-ieee-float32
  | +--ro bidirectional-available-bandwidth? rt-types:bandwidth-ieee-float32
  | +--ro bidirectional-utilized-bandwidth? rt-types:bandwidth-ieee-float32
  | +--ro utilized-percentage?          uint8
  | +--ro te-grouped-params*           -> /te:te/tunnels/tunnel/te-kpi:te-telemetry/id
  | +--ro grouping-operation?          grouping-operation
```

Next Steps

- This draft provides Customer-programmable PM telemetry and Network Automatics on the CMI/MPI of ACTN architecture.
 - TE-Tunnel level
 - ACTN-VN level
- The authors believe this draft has a good base for WG adoption 😊

Thanks!