DetNet Configuration YANG Model Update

draft-geng-detnet-conf-yang-03

Xuesong Geng (gengxuesong@huawei.com)
Mach Chen  (mach.chen@huawei.com)
Zhenqiang Li (lizhengqiang@chinamobile.com)
Reshad Rahman(rrahman@cisco.com)
• Quick Review of version 01
  • Topology Data Model
    • Collect the detnet capability data from the network (ietf-detnet-topology)
  • Static Configuration Model

• What’s new in version 02
  • Change ietf-detnet-static-config to ietf-detnet-flow-config
    • Flow dependent configurations after path computation (ietf-detnet-flow-config)
  • Add a new model: Device Data Model
    • Flow independent configurations, common for all flows (ietf-detnet-device)
DetNet Flow Configuration YANG Model

- **DetNet Service Proxy Instance (DSPI)**
  - For DetNet Edge Node configuration;
  - Map client flows to DetNet services;

- **DetNet Service Instance (DSI)**
  - For DetNet Relay Node configuration;
  - Enable/disable Replication/Elimination/Ordering;
  - Configure service path (e.g., multi-detnet-segment);

- **DetNet Transit Instance (DTI)**
  - For DetNet Transit Node configuration;
  - Build up transit tunnel between DetNet Service Instance;
  - Configure QoS parameters (e.g., bandwidth, priority, etc.) of the tunnels;
    - Configure queuing management algorithm parameters;

**Figure 3: End-to-end DetNet Flow Configuration**

draft-finn-detnet-bounded-latency-00 5.1.1. Per-flow queuing
DetNet Service Proxy Instance

- DSPI intends to define the mapping relationship between “client flows” and a DetNet Service Instance (DSI):
  - For each Edge Node, there will be multiple DSPIs (defined as a list);
  - Each DSPI includes:
    - A list of client flows, each flow includes:
      - Flow Identification: for differentiating client flows;
      - Traffic Specification: for flow filtering and shaping;
    - A DetNet Service Instance;
    - One or multiple client flow map to a single DetNet Service Instance (DSI)
DetNet Service Instance

• A DSI includes
  • in-segments: defined as a list
  • out-segments: defined as list
  • The mapping between the in-segments and the out-segments

• In-segment:
  • Function
    • Replication/Elimination/Ordering/Inter-network Function (see next slides)
  • Two use cases:
    • non-detnet-in-segment
      • At the ingress Edge Node
      • Enable Sequence-number-generation
    • detnet-in-segment
      • At the Relay Nodes or Egress Node;
      • Incoming-interface
      • Flow identification: flow identification in this relay node or egress node

• Out-segment includes:
  • Out-going-interface
  • Flow Identification: flow identification in next relay node (or egress node)
  • DetNet Transport Instance: highly depends on the data plane solution (TBD)
DetNet Service Instance Functions

• Replication & Elimination
  • With the in-segments and out-segments and the mapping between them, the Replication and Elimination Functions can be implemented.
  • The right figures show different mapping models

• Ordering
  • Ordering Packet number
    • Maximum number of packets that are allowed to be buffered
    • Limited by the buffer size

• DetNet Inter-network Function
  • Flow Identification
    • Included by the in-segment content
  • Sequence Number
    • Copy: the sequence number is directly copied from one encapsulation to the other encapsulation
    • Translation: the sequence number of one encapsulation maps to the other encapsulation
    • Re-generation: generate new sequence number when the encapsulation changes

draft-ietf-detnet-dp-sol-mpls-00
Section 5.3 DetNet Inter-Working Function
Add a new function: Detnet Inter-working function
DetNet Flow Aggregation

- **Aggregation at the LSP**
  - Defined in DetNet Service Instance (DSI)
  - Multiple DetNet flows share the same DetNet Transport Instance (DTI)

- **Aggregating DetNet flows as a new DetNet flow**
  - Defined in DetNet Service Proxy Instance (DSPI)
  - Multiple client flows map to a single DetNet Service Instance (DSI)
  - Both Service and Aggregate layer have Sequence number

- **Simple Aggregation at the DetNet layer**
  - Defined in DetNet Service Proxy Instance (DSPI)
  - Multiple client flows map to a single DetNet Service Instance (DSI)
  - Only service layer has sequence number
  - Aggregate layer does not have sequence number
### DetNet Device YANG Model

- **DetNet Device YANG Model:**
  - Enable/disable Packet Replication Function (PRF)
  - Enable/disable Packet Elimination Function (PEF)
  - Enable/disable Packet Ordering Function (POE)

- **DetNet Interfaces:**
  - Configure Queuing Management Algorithm
  - Share with the TSN interface configuration
    - Defined in IEEE, augment ietf-interfaces

---

**Queuing Management Algorithm | YANG Model in IEEE**

<table>
<thead>
<tr>
<th>IEEE TSN</th>
<th>iee802-dot1q-tsn</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE P802.1 Qbv</td>
<td>iee802-dot1q-sched</td>
</tr>
<tr>
<td>IEEE P802.1 Qci</td>
<td>iee802-dot1q-psfp</td>
</tr>
<tr>
<td>IEEE P802.1 Qcu</td>
<td>TBD</td>
</tr>
<tr>
<td>IEEE P802.1 Qch</td>
<td>TBD</td>
</tr>
<tr>
<td>IEEE P802.1 Qcr</td>
<td>TBD</td>
</tr>
<tr>
<td>IEEE P802.1 CB</td>
<td>TBD</td>
</tr>
</tbody>
</table>

---

It is to be decided that whether it is defined in the device or in the interface.
Coordination with TSN Yang Model Design in IEEE

**Whole picture of yang model in IETF**
- Transport (Netconf, Restconf, SNMP)
  - CUC \(\rightarrow\) YANG
  - Scheduler
  - YANG \(\rightarrow\) CUC

- Topology \(\rightarrow\) YANG
- Device properties: Constraints

**Physical Topology (network)**
- Device constrains and properties
- TSN datastreams (UNI)
- User defined constrains for datastreams
- Clock synchronization

**YANG Output Models**
- **1Qbv** (MIB exists, experimental YANG modules)
  - Scheduling
  - Bridge internal routing - mapping of streams ID to queues
- **1CB** (neither MIB nor YANG model exists)
  - Not related to scheduling
    - **1Qcl** (MIB exists, no YANG model exists)
    - **1AS-rev** (existing MIBs from 1588-2008, no YANG model exists)
What is the next?

- DetNet Transport Instance
- More functions and parameters corresponding to the data plane design
- ietf-detnet-ip/ietf-detnet-mpls/ietf-detnet-sr
- More Comments and contributions are welcome
- WG adoption?
Thanks