DetNet Configuration YANG Model

draft-ietf-detnet-yang-07

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Status

• Merged two Models from Last draft
  • Some terminology alignment.
  • Agreed to work the remaining changes into the single model.
  • Now Supports the flow model attributes

• Need to Publish Yanglint config for sample configurations
  • This is working for the model but it is not in the draft.

• Plan to review Model and add Service Sub-layer aggregation
  • Forwarding Sub layer aggregation falls out from the model.

• Need to check terminology for consistency and clarity.
• Need to confirm data plane match data plane drafts.
History

- Version 00: accepted as a WG document after IETF 102
- Version 01: `ietf-detnet-topology-yang` is defined independently
- Version 02: updated following the feedback from IETF103
  - Add ‘Sequence Number Generation’
    - OAM considerations
  - Add ‘DetNet Service Decapsulation’
  - Add ‘DetNet Transport Tunnel Decapsulation’
- Version 03: DetNet Configuration Structure Update in IETF104 and IETF105
- Version 04:
  - Modify the scope of DetNet YANG Model
- Version 05/06:
  - Two YANG Models Discussion -> Comparison
- Version 07:
  - Merging Models. Some terminology alignment.

WG Call Meeting Every Week
Scenarios Covered by DetNet YANG Model
(w/o Aggregation)

**Corresponding Data Plane drafts:**
- draft-ietf-detnet-ip-06
- draft-ietf-detnet-ip-over-mpls-06
- draft-ietf-detnet-mpls-07
- draft-ietf-detnet-mpls-over-udp-ip-06 (Partial)
- draft-ietf-detnet-tns-vpn-over-mpls-03 (Partial)
- draft-ietf-detnet-mpls-over-tns-03 (Not yet)
- draft-ietf-detnet-ip-over-tns-03 (Not yet)

Not shown Ethernet or other Tunnels as be underlay
Flow Model Attributes Supported by YANG

App-flow, DetNet flow and DetNet service

**App-flow**

**Characteristics**
- FlowID: unique (manag.) ID
- FlowType: Eth, MPLS, IP
- DataFlowSpecification: src/dst-addr, label, VLAN, etc.
- TrafficSpecification: interval, pckt-size, max-packet
- FlowEndpoints: Src, Dst(s)
- FlowRank
- FlowStatus

**Requirements**
- FlowRequirements: MinBW, PD, PDV, Loss, etc.
- FlowBiDir

**DetNet flow**

**Characteristics**
- DnFlowID: unique (manag.) ID
- DnPayloadType: Eth, MPLS, IP
- DnFlowFormat: MPLS, IP
- DnFlowSpecification: Label, 6-tuple
- DnTrafficSpecification: interval, pckt-size, max-packet
- DnFlowEndpoints: Ingress, Egress(s)
- DnFlowRank
- DnFlowStatus

**Requirements**
- DnFlowRequirements: MinBW, MaxLatency, MaxLatencyVariation, MaxLoss, MaxConsecutiveLossTolerance, MaxMisordering
- DnFlowBiDir

**DetNet service**

**Characteristics**
- DnServiceID: unique (manag.) ID
- DnServiceDeliveryType: Eth, MPLS, IP
- DnServiceConnectivity: p2p, p2mp
- DnServiceRank
- DnServiceDeliveryProfile: MaxBW, MaxLatency, MaxLatencyVariation, MaxLoss, MaxConsecutiveLossTolerance, MaxMisordering
- DnServiceBiDir
- DnServiceStatus

Service Requirements similar to e.g., 802.1Qcc Attributes like UserToNetworkRequirements

A DetNet flow contains one or more App-flows (N:1 mapping).

A DetNet service supports one or more DetNet-flows (M:1 mapping).

A DetNet flow contains one or more App-flows (N:1 mapping).
Relating the DetNet flows to the YANG Model


“From the data plane App-flow identification at a DetNet service sub-layer is realized by an S-Label.”


“A DetNet flow includes one or more App-flow(s) as payload.”

• When aggregation is added to the YANG model, with A-Labels in the MPLS case, we will have DetNet Flows.
Updated YANG Model tree : App-flow

module: ietf-detnet-config
  +--rw detnet
    +--rw app-flows
      +--rw app-flow* [name]
        +--rw app-id?       uint16
        +--rw app-flow-bidir-congruent? boolean
        +--rw outgoing-service? service-sub-layer-ref
        +--rw incoming-service? service-sub-layer-ref
      +--rw traffic-requirements
        +--rw ingress
          +--rw name?        string
          +--ro app-flow-status? identityref
          +--rw interface?   if:interface-ref
          +--:(data-flow-type)?
            +--:(tsn-app-flow)
            +--:(ip-app-flow)
            +--:(mpls-app-flow)
        +--rw egress
          +--rw name?        string
          +--rw (application-type)?
            +--:(ethernet)
            +--:(ip-mpls)
            +--rw ip-mpls
              +--rw (next-hop-options)
                +--rw outgoing-interface? if:interface-ref
                +--rw (flow-type)?
                  +--:(ip)
                  +--:(mpls)
                  +--:(next-hop-list)
                    +--rw next-hop-list
                      +--rw next-hop? [hop-index]
                        +--rw hop-index       uint8
                        +--rw outgoing-interface? if:interface-ref
                        +--rw (flow-type)?
                          +--:(ip)
                          +--:(mpls)
Updated YANG Model tree : Service Sub-layer

```
++-rw service-sub-layer
   +--rw service-sub-layer-list* [name]
   |   +--rw name string
   |   +--ro service-id? uint16
   |   +--rw service-rank? uint8
   |   +--rw traffic-requirements
   |   +--rw traffic-specification
   |   +--rw service-protection
   |   +--rw service-operation-type? service-operation-type
   |   +--rw incoming
   |       |   +--rw (incoming-options)
   |       |       |   +--:(ingress-proxy)
   |       |       |       |   +--rw app-flow* app-flow-ref
   |       |       |       |   +--:(detnet-service-identification)
   |       |       |       |       |   +--:(ip-detnet-flow)
   |       |       |       |       |   +--:(mpls-detnet-flow)
   |       +--rw outgoing
   |           |   +--rw (outgoing-options)
   |           |       |   +--:(egress-proxy)
   |           |       |       |   +--:(detnet-service-outgoing)
   |           |       |       |       |   +--rw service-outgoing-list* [service-outgoing-index]
   |           |       |       |       |       |   +--rw service-outgoing-index uint8
   |           |       |       |       |       |   +--:(detnet-egress-flow)
   |           |       |       |       |       |   +--:(detnet-ip-header)
   |           |       |       |       |       |   +--:(detnet-mpls-header)
   |           |       |       |       |       |   +--rw next-layer* [index]
   |           |       |       |       |       |   +--rw index uint8
   |           |       |       |       |       |   +--rw forwarding-sub-layer? forwarding-sub-layer-ref
```
Updated YANG Model tree: Forwarding Sub-layer

relay/ingress node for forwarding output

relay/egress node for forwarding input

transit node

relay/egress node for forwarding output

transit node

relay/ingress node for forwarding input

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Example: IP App-flow, DetNet MPLS (bidirectional)
Edge Node

Applications : Service \( n : 1 \)

Interfaces: Application Ingress/Egress \( k : 1 \)

DetNet Flows : Service \( m : 1 \)

Forwarding-Sub-layers : Service \( x : 1 \)

Interfaces: Forwarding-Sub-layers \( y : 1 \)
Yanglint JSON sample configuration: edge node

```json
> data -t config -f json ingress_node-bidir-app.xml

"ietf-interfaces:interfaces": {
    "interface": [
        {
            "name": "eth0",
            "type": "iana-if-type:ethernetCsmacd"
        },
        {
            "name": "eth1",
            "type": "iana-if-type:ethernetCsmacd"
        }
    ],
    "ietf-detnet-config:detnet": {
        "app-flows": {
            "app-flow": [
                {
                    "name": "app-1",
                    "app-flow-bidir-congruent": true,
                    "incoming-service": "ssl-1",
                    "ingress": {
                        "name": "port1",
                        "interface": "eth0",
                        "src-ip-prefix": "1.1.1.1/32",
                        "dest-ip-prefix": "8.8.8.8/32",
                        "traffic-class": 48
                    },
                    "egress": {
                        "name": "port1",
                        "ip-mpls": {
                            "outgoing-interface": "eth0"
                        }
                    }
                }
            ],
            "service-sub-layer": {
                "service-sub-layer-list": [
                    {
                        "name": "ssl-1",
                        "service-rank": 10,
                        "traffic-requirements": {
                            "min-bandwidth": "100000000",
                            "max-latency": "1000000000",
                            "max-latency-variation": "20000000",
                            "max-loss": 2,
                            "max-consecutive-loss-tolerance": 5,
                            "max-misordering": 0
                        },
                        "service-protection": {
                            "service-protection-type": "none",
                            "sequence-number-length": "long-sn"
                        },
                        "service-operation-type": "service-initiation",
                        "incoming": {
                            "app-flow": [
                                "app-1"
                            ]
                        },
                        "outgoing": {
                            "outgoing-service": "ssl-2",
                            "service-outgoing-list": [
                                {
                                    "service-outgoing-index": 1,
                                    "mpls-label-stack": {
                                        "entry": {
                                            "id": 1,
                                            "label": 55555,
                                            "traffic-class": 5
                                        }
                                    },
                                    "next-layer": {"index": 0,
                                    "forwarding-sub-layer": "fsl-1"
                                }
                            ]
                        }
                    }
                ],
                "service-sub-layer-list": [
                    {
                        "name": "ssl-2",
                        "service-rank": 10,
                        "traffic-requirements": {
                            "min-bandwidth": "100000000",
                            "max-latency": "1000000000",
                            "max-latency-variation": "20000000",
                            "max-loss": 2,
                            "max-consecutive-loss-tolerance": 5,
                            "max-misordering": 0
                        },
                        "service-protection": {
                            "service-protection-type": "none",
                            "sequence-number-length": "long-sn"
                        },
                        "service-operation-type": "service-termination",
                        "incoming": {
                            "label": 55555,
                            "app-flow": [
                                "app-1"
                            ]
                        },
                        "outgoing": {
                            "app-flow": ["app-1"
                            ]
                        }
                    }
                ],
                "forwarding-sub-layer": {
                    "forwarding-sub-layer-list": [
                        {
                            "name": "fsl-2",
                            "traffic-specification": {
                                "interval": 5,
                                "max-packets-per-interval": 10,
                                "max-payload-size": 1500
                        },
                        "forwarding-operation-type": "impose-and-forward",
                        "incoming": {
                            "service-sub-layer": ["ssl-2"
                        ]
                    },
                    "outgoing": {
                        "outgoing-interface": "eth1"
                    }
                },
                "forwarding-sub-layer": {
                    "forwarding-sub-layer-list": [
                        {
                            "name": "fsl-1",
                            "traffic-specification": {
                                "interval": 5,
                                "max-packets-per-interval": 10,
                                "max-payload-size": 1500
                        },
                        "forwarding-operation-type": "pop-and-lookup",
                        "incoming": {
                            "interface": "eth1",
                            "label": 42
                        },
                        "outgoing": {
                            "service-sub-layer": ["ssl-1"
                        ]
                    }
                }
            ]
        }
    }
}"
```
Plan

• Comments and reviewing the current Model.
  • Terminology consistency
  • Adding Service Sub-layer Aggregation.
  • Double check Flow Model consistency
  • Continuing with Yanglint validation of the sample configuration.

• General clean up
  • Clean up YANG
  • Address Nits for draft
  • Include Yanglint xml sample configuration
Thanks

Questions/Comments?