DetNet Configuration YANG Update

draft-ietf-detnet-yang-03

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DetNet Configuration Instance

DetNet Config:

- App Flow Instance
- Service Sub-layer Instance
- Forwarding Sub-layer Instance
- TSN Sub-network Instance (TBD)

DetNet data plane protocol stack*

DetNet Configuration Structure Update

- **App Flow** *
  - Name
  - Operations
  - In-segments
  - Out-segments

- **Service Sub-layer instance** *
  - Name
  - Operations
  - In-segments
  - Out-segments

- **Forwarding Sub-layer instance** *
  - Name
  - Operations
  - In-segments
  - Out-segments

- **Sub-network** *
  - Name
  - Operations
  - In-segments
  - Out-segments
App Flow

<table>
<thead>
<tr>
<th>Operations</th>
<th>In-segments</th>
<th>Out-segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sequence Number Generation:</td>
<td>• L3-app-flow-identification</td>
<td>• DetNet Service Sub-layer Instance</td>
</tr>
<tr>
<td></td>
<td>• copy-from-app-flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• generate-by-detnet-flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• sequence-number-length</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• none</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• L2-app-flow-identification</td>
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</tr>
<tr>
<td></td>
<td>• L2-identification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• detnet-flow-identification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ipv4-identification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ipv6-identification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mpls-identification</td>
<td></td>
</tr>
</tbody>
</table>

*Question: Whether Sequence Number Generation should be in App flow Instance or Service sub-layer instance?
App Flow Tree

```mermaid
diagram border none
graph LR
  app[App] --> flow-tree[Flow Tree]
  flow-tree --> rw-proxy[rw_proxy]
  rw-proxy --> rw-operations[rw_operations]
  rw-operations --> rw-sequence-number[rw_sequence-number]
  rw-sequence-number --> rw-sequence-number-generation-type[rw_sequence-number-generation-type]
  rw-sequence-number --> rw-sequence-number-length[rw_sequence-number-length]
  rw-sequence-number --> rw-in-segments[rw_in-segments]
  rw-in-segments --> rw-app-flow-type[rw_app-flow-type]
  rw-in-segments --> rw-source-mac-address[rw_source-mac-address]
  rw-in-segments --> rw-destination-mac-address[rw_destination-mac-address]
  rw-in-segments --> ethertype[ethertype]
  rw-in-segments --> vlan-id[rw_vlan-id]
  rw-in-segments --> pcp[rw_pcp]
  rw-in-segments --> src-ipv4-prefix[rw_src-ipv4-prefix]
  rw-in-segments --> dest-ipv4-prefix[rw_dest-ipv4-prefix]
  rw-in-segments --> protocol[rw_protocol]
  rw-in-segments --> dscp[rw_dscp]
  rw-in-segments --> dscp-bitmask[rw_dscp-bitmask]
  rw-in-segments --> src-ipv6-prefix[rw_src-ipv6-prefix]
  rw-in-segments --> dest-ipv6-prefix[rw_dest-ipv6-prefix]
  rw-in-segments --> next-header[rw_next-header]
  rw-in-segments --> traffic-class[rw_traffic-class]
  rw-in-segments --> traffic-class-bitmask[rw_traffic-class-bitmask]
  rw-in-segments --> flow-label[rw_flow-label]
  rw-in-segments --> flow-label-flac[rw_flow-label-flac]
  rw-in-segments --> lower-source-port[rw_lower-source-port]
  rw-in-segments --> upper-source-port[rw_upper-source-port]
  rw-in-segments --> lower-destination-port[rw_lower-destination-port]
  rw-in-segments --> upper-destination-port[rw_upper-destination-port]
  rw-in-segments --> detnet-service-sub-layer[rw_detnet-service-sub-layer]
```

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# Service Sub-layer Instance

<table>
<thead>
<tr>
<th>Operations</th>
<th>In-segments</th>
<th>Out-segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Service Operation</td>
<td>• DetNet Flow identification</td>
<td>• DetNet Service sub-layer Encapsulation</td>
</tr>
<tr>
<td>• Service Initiation</td>
<td>• Ipv4-identification</td>
<td>• DetNet-mpls-header</td>
</tr>
<tr>
<td>• Service Termination</td>
<td>• Ipv6-identification</td>
<td>• DetNet-ipv4-header</td>
</tr>
<tr>
<td>• Service Relay</td>
<td>• Mpls-identification</td>
<td>• DetNet-ipv6-header</td>
</tr>
<tr>
<td>• Service Protection Operations:</td>
<td></td>
<td>• DetNet Forwarding Sub-layer Instance</td>
</tr>
<tr>
<td>• Replication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Elimination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ordering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Elimination &amp; Ordering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Elimination &amp; Replication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Elimination &amp; Ordering &amp; Replication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Service Sub-layer Instance Tree

---rw service-sub-layer
  | ---rw operations
  |    | ---rw service-operation
  |    |    | ---rw service-operation-type? service-operation-ref
  |    | ---rw service-protection
  |    |    | ---rw service-protection-type? service-protection-type
  |    | ---rw in-segments
  |    |    | ---rw detnet-service-type? flow-type-ref
  |    |    | ---rw detnet-service-list* [detnet-service-index]
  |    |    |     | ---rw detnet-service-index uint8
  |    |    |     | ---rw src-ipv4-prefix inet:ipv4-prefix
  |    |    |     | ---rw dest-ipv4-prefix inet:ipv4-prefix
  |    |    |     | ---rw protocol uint8
  |    |    |     | ---rw dscp? uint8
  |    |    |     | ---rw dscp-bitmask? uint8
  |    |    |     | ---rw src-ipv6-prefix inet:ipv6-prefix
  |    |    |     | ---rw dest-ipv6-prefix inet:ipv6-prefix
  |    |    |     | ---rw next-header uint8
  |    |    |     | ---rw traffic-class? uint8
  |    |    |     | ---rw traffic-class-bitmask? uint8
  |    |    |     | ---rw flow-label? inet:ipv6-flow-label
  |    |    |     | ---rw flow-label-flag? boolean
  |    |    |     | ---rw mpls-flow-identification
  |    |    |     |     | ---rw platform-label-flag? boolean
  |    |    |     |     | ---rw non-platform-label-space
  |    |    |     |     |     | ---rw non-platform-label-stack* [if:interface-ref]
  |    |    |     |     |     | ---rw index uint8
  |    |    |     |     |     | ---rw label? rt-type:mpls-label
  |    |    |     |     |     | ---rw tc? uint8
  |    |    |     | ---rw platform-label-space
  |    |    |     |     | ---rw label? rt-type:mpls-label
  |    |    |     |     | ---rw tc? uint8
  | ---rw out-segments
  |    | ---rw detnet-service-processing-type? flow-type-ref
  |    | ---rw detnet-service-encapsulation
  |    |    | ---rw detnet-service-processing-list* [detnet-service-processing-index]
  |    |    |    | ---rw ip-flow
  |    |    |    |    | ---rw dst-ipv4-address inet:ipv4-address
  |    |    |    |    | ---rw protocol uint8
  |    |    |    |    | ---rw dscp? uint8
  |    |    |    |    | ---rw ip6-flow
  |    |    |    |    | ---rw src-ipv6-address inet:ipv6-address
  |    |    |    |    | ---rw dest-ipv6-address inet:ipv6-address
  |    |    |    |    | ---rw next-header uint8
  |    |    |    |    | ---rw traffic-class? uint8
  |    |    |    |    | ---rw traffic-class-bitmask? uint8
  |    |    |    |    | ---rw flow-label? inet:ipv6-flow-label
  |    |    |    |    | ---rw 14-port-header
  |    |    |    |    | ---rw source-port? inet:port-number
  |    |    |    |    | ---rw destination-port? inet:port-number
  | ---rw mpls-flow
  |    | ---rw detnet-mpls-label-stack* [index]
  |    |    | ---rw index uint8
  |    |    | ---rw label? rt-type:impls-label
  |    |    | ---rw tc? uint8
  |    |    | ---rw s-bit? boolean
  |    |    | ---rw d-cw-encapsulate-flag? boolean
  | ---rw detnet-forwarding-sub-layer-info
  |    | ---rw detnet-forwarding-sub-layer? lower-layer-ref
# Forwarding Sub-layer Instance

<table>
<thead>
<tr>
<th>Operations</th>
<th>In-segments</th>
<th>Out-segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Resource Allocation</td>
<td>• Forwarding Identification</td>
<td>• Forwarding Sub-layer Encapsulation</td>
</tr>
<tr>
<td>• Traffic-Specification</td>
<td>• Forwarding Identification</td>
<td>• DetNet-mpls-header</td>
</tr>
<tr>
<td></td>
<td>• Ipv4-destination-address</td>
<td>• Outgoing interface</td>
</tr>
<tr>
<td></td>
<td>• Ipv6-destination-address</td>
<td>• Sub-network Instance</td>
</tr>
<tr>
<td></td>
<td>• Mpls-identification</td>
<td></td>
</tr>
</tbody>
</table>
Forwarding Sub-layer Instance Tree

---rw forwarding-sub-layer
  | ---rw operations
  |   | ---rw forwarding-operation
  |     | ---rw forwarding-operation-type? forwarding-operation-ref
  |     | ---rw resource-allocate
  |     |   | ---rw interval? uint32
  |     |   | ---rw max-packets-per-interval? uint32
  |     |   | ---rw max-payload-size? uint32
  |     |   | ---rw average-packets-per-interval? uint32
  |     |   | ---rw average-payload-size? uint32
  | ---rw qos
  | ---rw in-segments
  | ---rw detnet-forwarding-type? flow-type-ref
  | ---rw src-ipv4-prefix inet:ipv4-prefix
  | ---rw dest-ipv4-prefix inet:ipv4-prefix
  | ---rw protocol uint8
  | ---rw dscp? uint8
  | ---rw dcsp-bitmask? uint8
  | ---rw src-ipv6-prefix inet:ipv6-prefix
  | ---rw dest-ipv6-prefix inet:ipv6-prefix
  | ---rw next-header uint8
  | ---rw traffic-class? uint8
  | ---rw traffic-class-bitmask? uint8
  | ---rw flow-label? inet:ipv6-flow-label
  | ---rw flow-label-flag? boolean
  | ---rw mpls-flow-identification
  |   | ---rw platform-label-flag? boolean
  |     | ---rw non-platform-label-space
  |       | ---rw incoming-interface? if:interface-ref
  |       | ---rw non-platform-label-stack* [index]
  |       | ---rw label? rt-type:mpls-label
  |       |   | --- rw tc? uint8
  |     | ---rw platform-label-space
  |       | ---rw label? rt-type:mpls-label
  |       | --- rw tc? uint8
  | --- rw out-segments
  | ---rw detnet-forwarding-processing-type? flow-type-ref
  | ---rw natively-detnet-forwarding
  | ---rw ipv4-flow
  |   | --- rw ipv4-next-hop-address? inet:ipv4-address
  | ---rw ipv6-flow
  |   | --- rw ipv6-next-hop-address? inet:ipv6-address
  | --- rw detnet-forwarding-encapsulation
  | --- rw ipv4-flow
  |   | --- rw src-ipv4-address inet:ipv4-address
  | --- rw dest-ipv4-address inet:ipv4-address
  | --- rw protocol uint8
  | --- rw dscp? uint8
  | ---rw ipv6-flow
  |   | --- rw src-ipv6-address inet:ipv6-address
  | --- rw dest-ipv6-address inet:ipv6-address
  | --- rw next-header uint8
  | ---rw traffic-class? uint8
  | --- rw flow-label? inet:ipv6-flow-label
  | --- rw 14-port-header
  |   | ---rw source-port? inet:port-number
  | ---rw destination-port? inet:port-number
  | --- rw mpls-flow
  |   | ---rw detnet-mpls-label-stack* [index]
  |     | --- rw index uint8
  |     | --- rw label? rt-type:mpls-label
  |     | --- rw tc? uint8
  |     | --- rw s-bit? boolean
  |     | --- rw d-cw-encapsulate-flag? boolean
  | --- rw lower-layer-info
  | --- rw lower-layer-type? flow-type-ref
  | --- rw interface
  | --- rw outgoing-interface? if:interface-ref
  | --- rw sub-layer
  | --- rw sub-layer? lower-layer-ref
“App flow” or “DetNet Service Proxy”? 

• Proxy can be the name of the node, maybe it also can be the name of the “sub-layer”:
• the picture in draft-ietf-detnet-architecture-13 shows:

• The text of draft-ietf-detnet-architecture-13 as follows:

  DetNet Edge Node: an instance of a DetNet relay node that acts as a source and/ or destination at the DetNet service sub-layer. For example, it can include a DetNet service sub-layer proxy function for DetNet service protection (e.g., the addition or removal of packet sequencing information) for one or more end systems, or starts or terminates resource allocation at the DetNet forwarding sub-layer, or aggregates DetNet services into new DetNet flows. It is analogous to a Label Edge Router (LER) or a Provider Edge (PE) router.
What is the next?

• The structure is accepted by the WG in this IETF (hopefully)
• More detailed designs are still under discussion
  • Aggregation Case
  • Some unsolved issues mentioned in the slides
  • Sub-network
• Please review the draft and give comments
• or just join us
• Weekly discussion about the yang model modification is suggested
Thanks