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H. Zheng
A. Guo
I. Busi
Huawei Technologies
Y. Xu
CAICT
Y. Zhao
China Mobile
X. Liu
Volta Networks
G. Fioccola
Telecom Italia

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A YANG Data Model for Client-layer Topology
draft-zheng-ccamp-client-topo-yang-03

Abstract

A transport network is a server-layer network to provide connectivity services to its client. In this draft the topology of client is described.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on March 3, 2019.

Table of Contents

1. Introduction

A transport network is a server-layer network designed to provide connectivity services for a client-layer network to carry the client traffic transparently across the server-layer network resources. The topology model in Traffic-Engineered network has been defined in both generic way and technology-specific way. The generic model, which is the base TE YANG model, can be found at [I-D.ietf-teas-yang-te-topo]. Technology-specific models, such as OTN/WSON topology model, have also been defined in [I-D.ietf-ccamp-otn-topo-yang] and [I-D.ietf-ccamp-wson-yang] respectively. Corresponding topology on client-layer is also required, to have a complete topology view from the perspective of network controllers.

This document defines a data model of all client-layer Topology, using YANG language defined in [RFC7950]. The model is augmenting the generic TE topology model, and can be used by either applications exposing to a network controller or among controllers. Furthermore,

it can be used by an application for topology description in client-layer network.

2. Terminology and Notations

A simplified graphical representation of the data model is used in this document. The meaning of the symbols in the YANG data tree presented later in this document is defined in [RFC8340]. They are provided below for reference.

- Brackets "[" and "]" enclose list keys.
- Abbreviations before data node names: "rw" means configuration (read-write) and "ro" state data (read-only).
- Symbols after data node names: "?" means an optional node, "!" means a presence container, and "*" denotes a list and leaf-list.
- Parentheses enclose choice and case nodes, and case nodes are also marked with a colon (":").
- Ellipsis ("...") stands for contents of subtrees that are not shown.

3. YANG Model for Topology of Client Layer

3.1. YANG Tree for Ethernet Topology

```
module: ietf-eth-te-topology
  augment /nd:networks/nd:network/nd:network-types/tet:te-topology:
    +--rw eth-tran-topology!
  augment /nd:networks/nd:network/lnk:link/tet:te/tet:te-link-attributes:
    +--rw max-bandwidth?          uint64
    +--rw available-bandwidth?    uint64
    +--rw available-vlan-range?   etht-types:vid-range-type
  augment /nd:networks/nd:network/nd:node/lnk:termination-point:
    +--rw ltp-mac-address?                    yang:mac-address
    +--rw port-vlan-id?                       etht-types:vlanid
    +--rw maximum-frame-size?                 uint16
    +--rw (direction)?
    |  +--:(symmetrical)
    |  |  +--rw ingress-egress-bandwidth-profile
    |  |     +--rw bandwidth-profile-name?   string
    |  |     +--rw bandwidth-profile-type?   etht-types:bandwidth-profile-type
    |  |     +--rw CIR?                      uint64
```

```
    |  |     +--rw CBS?                      uint64
    |  |     +--rw EIR?                      uint64
    |  |     +--rw EBS?                      uint64
    |  |     +--rw color-aware?              boolean
    |  |     +--rw coupling-flag?            boolean
    |  +--:(asymmetrical)
    |     +--rw ingress-bandwidth-profile
    |     |  +--rw bandwidth-profile-name?   string
    |     |  +--rw bandwidth-profile-type?   etht-types:bandwidth-profile-type
    |     |  +--rw CIR?                      uint64
    |     |  +--rw CBS?                      uint64
    |     |  +--rw EIR?                      uint64
    |     |  +--rw EBS?                      uint64
    |     |  +--rw color-aware?              boolean
    |     |  +--rw coupling-flag?            boolean
    |     +--rw egress-bandwidth-profile
    |        +--rw bandwidth-profile-name?   string
    |        +--rw bandwidth-profile-type?   etht-types:bandwidth-profile-type
    |        +--rw CIR?                      uint64
    |        +--rw CBS?                      uint64
    |        +--rw EIR?                      uint64
    |        +--rw EBS?                      uint64
    |        +--rw color-aware?              boolean
    |        +--rw coupling-flag?            boolean
    +--rw svc!
       +--rw client-facing?               boolean
       +--rw supported-classification
       |  +--rw port-classification?   boolean
       |  +--rw vlan-classification
       |     +--rw vlan-tag-classification?   boolean
       |     +--rw outer-tag
       |     |  +--rw supported-tag-types*   etht-types:eth-tag-classify
       |     |  +--rw vlan-bundling?         boolean
       |     |  +--rw vlan-range?            etht-types:vid-range-type
       |     +--rw second-tag
       |        +--rw second-tag-classification?   boolean
       |        +--rw supported-tag-types*         etht-types:eth-tag-classify
       |        +--rw vlan-bundling?               boolean
       |        +--rw vlan-range?                  etht-types:vid-range-type
       +--rw supported-vlan-operations
          +--rw asymmetrical-operations?       boolean
          +--rw transparent-vlan-operations?   boolean
          +--rw vlan-pop
          |  +--rw vlan-pop-operations?   boolean
          |  +--rw max-pop-tags?          uint8
          +--rw vlan-push
             +--rw vlan-push-operation?   boolean
             +--rw outer-tag
```

```
            |  +--rw supported-tag-types*   etht-types:eth-tag-type
            |  +--rw vlan-range?            etht-types:vid-range-type
            +--rw second-tag
               +--rw push-second-tag?       boolean
               +--rw supported-tag-types*   etht-types:eth-tag-type
               +--rw vlan-range?            etht-types:vid-range-type
```

3.2. YANG Tree for topology Model of other Client Layer

This section will be completed later.

4. YANG Code for Topology Client Layer

4.1. The ETH Topology YANG Code

<CODE BEGINS> file "ietf-eth-te-topology@2018-03-01.yang"

```
module ietf-eth-te-topology {

        namespace "urn:ietf:params:xml:ns:yang:ietf-eth-te-topology";

        prefix "ethtetopo";

        import ietf-network {
                prefix "nd";
        }

        import ietf-network-topology {
                prefix "lnk";
        }

        import ietf-te-topology {
                prefix "tet";
        }

        import ietf-yang-types {
                prefix "yang";
        }

        import ietf-eth-tran-types {
                prefix "etht-types";
        }
```

```
        organization
                "Internet Engineering Task Force (IETF) CCAMP WG";
  contact
    "
      WG List: <mailto:ccamp@ietf.org>

      ID-draft editor:
        Haomian Zheng (zhenghaomian@huawei.com);
        Italo Busi (italo.busi@huawei.com);
        Aihua Guo (aihuaguo@huawei.com);
        Yunbin Xu (xuyunbin@ritt.cn);
        Yang Zhao (zhaoyangyjy@chinamobile.com);
        Xufeng Liu (Xufeng_Liu@jabil.com);
        Giuseppe Fioccola (giuseppe.fioccola@telecomitalia.it);
    ";

        description
                "This module defines a YANG data model for describing
                layer-2 Ethernet transport topologies.";

        revision 2018-03-01 {
                description
                        "Initial revision";
                reference
                        "draft-zheng-ccamp-client-topo-yang";
        }

        /*
        Groupings
        */

        grouping eth-tran-topology-type {
                description
                        "Identifies the Ethernet Transport topology type";

                container eth-tran-topology {
                        presence "indicates a topology type of Ethernet
                                                                Transport
Network.";
                        description "Eth transport topology type";
                }
        }

        grouping eth-link-te-attributes {
                description "Ethernet TE link attributes";

                leaf max-bandwidth {
                        type uint64{
                                range "0..10000000000";
```

```
                        }
                        units "Kbps";
                        description
                                "Maximum bandwith value expressed in kilobits
per second";
                }

                leaf available-bandwidth {
                        type uint64{
                                range "0..10000000000";
                        }
                        units "Kbps";
                        description
                                "Available bandwith value expressed in kilobits
per second";
                }

                leaf available-vlan-range {
                        type etht-types:vid-range-type;
                        description
                                "The range of the VLAN values that are
available.";
                }
        }

        grouping ltp-bandwidth-profiles {
                description
                        "A grouping which represents the bandwidt profile(s)
for the ETH LTP.";

                choice direction {
                        description
                                "Whether the bandwidth profiles are symmetrical
or
                                 asymmetrical";
                        case symmetrical {
                                description
                                        "The same bandwidth profile is used to
describe the ingress
                                        and the egress bandwidth profile.";

                                container ingress-egress-bandwidth-profile {
                                        description
                                                "The bandwith profile used in
the ingress and egress direction.";
                                        uses etht-types:etht-bandwidth-
profiles;
                                }
```

```
                        }
                        case asymmetrical {
                                description
                                        "Different ingress and egress bandwidth
profiles
                                        can be specified.";
                                container ingress-bandwidth-profile {
                                        description
                                                "The bandwidth profile used in
the ingress direction.";
```

```
                                        uses etht-types:etht-bandwidth-
profiles;
                                }
                                container egress-bandwidth-profile {
                                        description
                                                "The bandwidth profile used in
the egress direction.";
                                        uses etht-types:etht-bandwidth-
profiles;
                                }
                        }
                }
        }

        grouping eth-ltp-attributes {
                description
                        "Ethernet transport link termination point attributes";

                /*
                        Open Issue: should we remove this attribute (duplicates
with I2RS L2 attributes)?
                */
                leaf ltp-mac-address {
                        type yang:mac-address;
                        description "the MAC address of the LTP.";
                }
                /*
                        Open Issue: should we remove this attribute (duplicates
with I2RS L2 attributes)?
                */
                leaf port-vlan-id {
                        type etht-types:vlanid;
                        description "the port VLAN ID of the LTP.";
                }
                /*
                        Open Issue: should we remove this attribute (duplicates
with I2RS L2 attributes)?
                */
                leaf maximum-frame-size {
                        type uint16 {
                                range "64 .. 65535";
                        }
                        description
                                "Maximum frame size";
                }
                uses ltp-bandwidth-profiles;
        }
```

```
        grouping svc-vlan-classification {
                description
                        "Grouping defining the capabilities for VLAN
classification.";

                leaf-list supported-tag-types {
                        type etht-types:eth-tag-classify;
```

```
                        description
                                "List of VLAN tag types that can be used for
the VLAN classification.
                                In case VLAN classification is not supported,
the list is empty.";
                }
                leaf vlan-bundling {
                        type boolean;
                        description
                                "In case VLAN classification is supported,
indicates whether VLAN bundling classification is also supported.";
                }
                leaf vlan-range {
                        type etht-types:vid-range-type;
                        description
                                "In case VLAN classification is supported,
indicates the of available VLAN ID values.";
                }
        }

        grouping svc-vlan-push {
                description
                        "Grouping defining the capabilities for VLAN push or
swap operations.";

                leaf-list supported-tag-types {
                        type etht-types:eth-tag-type;
                        description
                                "List of VLAN tag types that can be used to
push or swap a VLAN tag.
                                In case VLAN push/swap is not supported, the
list is empty.";
                }
                leaf vlan-range {
                        type etht-types:vid-range-type;
                        description
                                "In case VLAN push/swap operation is supported,
the range of available VLAN ID values.";
                }
        }

        grouping eth-ltp-svc-attributes {
                description
                        "Ethernet link termination point (LTP) service
attributes.";

                leaf client-facing {
                        type boolean;
```

```
                        description
                                "indicates whether this LTP is a client-facing
ltp.";
                }

                container supported-classification {
                        description
                                "Service classification capabilities supported
by the ETH LTP.";

                        leaf port-classification {
```

```
                                type boolean;
                                description
                                        "Indicates that the ETH LTP support
port-based service classification.";
                        }
                        container vlan-classification {
                                description
                                        "Service classification capabilities
based on the VLAN tag(s)
                                        supported by the ETH LTP.";

                                leaf vlan-tag-classification {
                                        type boolean;
                                        description
                                                "Indicates that the ETH LTP
supports VLAN service classification.";
                                }
                                container outer-tag {
                                        description
                                                "Service classification
capabilities based on the outer VLAN tag,
                                                supported by the ETH LTP.";
                                        uses svc-vlan-classification;
                                }
                                container second-tag {
                                        description
                                                "Service classification
capabilities based on the second VLAN tag,
                                                supported by the ETH LTP.";
                                        /*
                                                Open issue: indicates that
second-tag-classification can be True only if
                                                outer-tag-classification is
also True.
                                        */
                                        leaf second-tag-classification {
                                                type boolean;
                                                description
                                                        "Indicates that the ETH
LTP support  VLAN service classification
                                                        based on the second
VLAN tag.";
                                        }
                                        uses svc-vlan-classification;
                                }
                        }
                }
```

```
                container supported-vlan-operations {
                description
                                "Description.";
                        leaf asymmetrical-operations {
                                type boolean;
                                description
                                        "Indicates whether the ETH LTP supports
also asymmetrical VLAN operations.
                                        It is assumed that symmetrical VLAN
operations are alwyas supported.";
                        }
```

```
                        leaf transparent-vlan-operations {
                                type boolean;
                                description
                                        "Indicates that the ETH LTP supports
transparent operations.";
                        }
                        container vlan-pop {
                                description
                                        "Indicates VLAN pop or swap operations
capabilities.";

                                leaf vlan-pop-operations {
                                        type boolean;
                                        description
                                                "Indicates that the ETH LTP
supports VLAN pop or swap operations.";
                                }
                                leaf max-pop-tags {
                                        type uint8 {
                                                range "1..2";
                                        }
                                        description
                                                "Indicates the maximum number
of tags that can be popped/swapped.";
                                }
                        }
                        container vlan-push {
                                description
                                        "Indicates VLAN push or swap operations
capabilities.";

                                leaf vlan-push-operation {
                                        type boolean;
                                        description
                                                "Indicates that the ETH LTP
supports VLAN push or swap operations.";
                                }
                                container outer-tag {
                                        description
                                                "Indicates the supported VLAN
operation capabilities on the outer VLAN tag.";
                                        uses svc-vlan-push;
                                }
                                container second-tag {
                                        description
                                                "Indicates the supported VLAN
operation capabilities on the second VLAN tag.";
```

```
                                    leaf push-second-tag {
                                            type boolean;
                                            description
                                                    "Indicates that the ETH
LTP supports VLAN push or swap operations
                                                    for the second VLAN
tag.";
                                    }
                                    uses svc-vlan-push;
                            }
```

```
                        }
                }
        }


        /*
        Data nodes
        */

        augment "/nd:networks/nd:network/nd:network-types/tet:te-topology" {
                description
                        "Augment network types to include ETH transport
newtork";

                uses eth-tran-topology-type;
        }

        augment "/nd:networks/nd:network/lnk:link/tet:te/tet:te-link-
attributes" {
                when "../../../nd:network-types/tet:te-topology/eth-tran-
topology" {
                        description
                                "Augment only for ETH transport network.";
                }
                description
                        "Augment ETH transport link config attributes";

                uses eth-link-te-attributes;
        }

        augment "/nd:networks/nd:network/nd:node/lnk:termination-point" {
                when "../../nd:network-types/tet:te-topology/eth-tran-
topology" {
                        description
                                "Augment only for ETH transport network";
                }
                description
                        "Augment ETH LTP attributes";

                uses eth-ltp-attributes;
                container svc {
                        presence "client-facing LTP.";

                        description
                                "ETH LTP Service attributes.";
                        uses eth-ltp-svc-attributes;
                }
        }
}
```

<CODE ENDS>

4.2. Other OTN client signal YANG Code

TBD.

5. Considerations and Open Issue

Editor Notes: This section is used to note temporary discussion/ conclusion that to be fixed in the future version, and will be removed before publication.

6. IANA Considerations

TBD.

7. Manageability Considerations

TBD.

8. Security Considerations

The data following the model defined in this document is exchanged via, for example, the interface between an orchestrator and a transport network controller. The security concerns mentioned in [I-D.ietf-teas-yang-te-topo] for using ietf-te-topology.yang model also applies to this document.

The YANG module defined in this document can be accessed via the RESTCONF protocol defined in [RFC8040], or maybe via the NETCONF protocol [RFC6241].

There are a number of data nodes defined in the YANG module which are writable/creatable/deletable (i.e., config true, which is the default). These data nodes may be considered sensitive or vulnerable in some network environments. Write operations (e.g., POST) to these data nodes without proper protection can have a negative effect on network operations.

Editors note: to list specific subtrees and data nodes and their sensitivity/vulnerability.

9. Acknowledgements

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10. Contributors

Yanlei Zheng
China Unicom
Email: zhengyl@dimpt.com

Zhe Liu
Huawei Technologies,
Email: liuzhe123@huawei.com

Zheyu Fan
Huawei Technologies,
Email: fanzheyu2@huawei.com

Sergio Belotti
Nokia,
Email: sergio.belotti@nokia.com

Yingxi Yao
Shanghai Bell,
yingxi.yao@nokia-sbell.com

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Authors' Addresses

Haomian Zheng
Huawei Technologies
F3 R&D Center, Huawei Industrial Base, Bantian, Longgang District
Shenzhen, Guangdong 518129
P.R.China

Email: zhenghaomian@huawei.com

Aihua Guo
Huawei Technologies

Email: aihuaguo@huawei.com

Italo Busi
Huawei Technologies

Email: Italo.Busi@huawei.com

Yunbin Xu
CAICT

Email: xuyunbin@ritt.cn

Yang Zhao
China Mobile

Email: zhaoyangyjy@chinamobile.com

Xufeng Liu
Volta Networks

Email: xufeng.liu.ietf@gmail.com

Giuseppe Fioccola
Telecom Italia

Email: giuseppe.fioccola@telecomitalia.it