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OTN Service YANG Model
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Abstract

This document describes the YANG data model for OTN Services.

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1. Introduction

OTN transport networks can carry various types of client services. In many cases, the client service is an OTN service across connected domains in a multi-domain network. These OTN services can either be transported or switched in the OTN network. If an OTN service is switched then additional parameters need to be provided to create a Mux OTN service.

This document provides YANG model for creating OTN service. The model augments the TE Tunnel model, which is an abstract model to create TE Tunnels.

2. Model Overview

This section provides an overview of the OTN Service Model.

2.1. OTN Mux Service

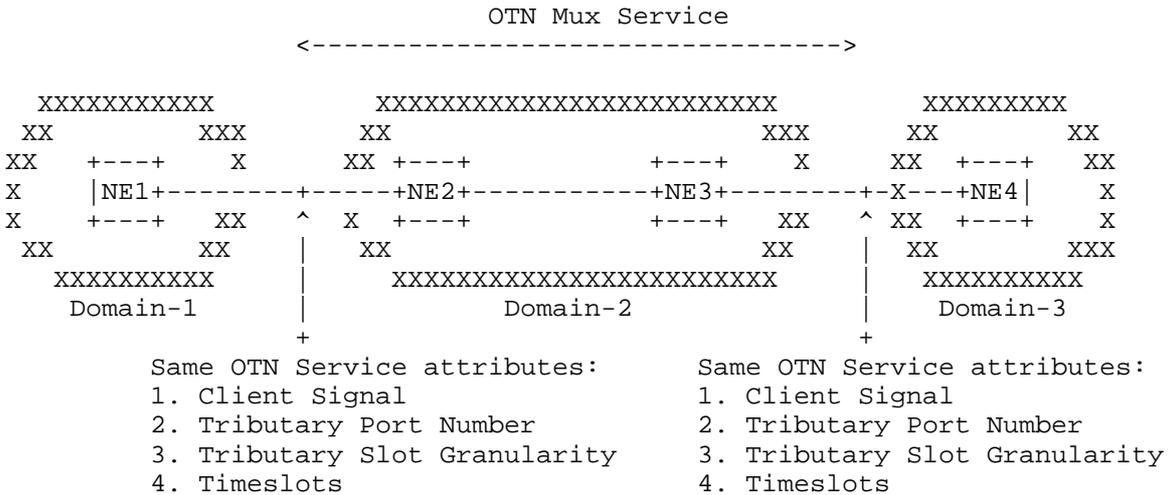


Figure 1: OTN Mux Service in a multi-domain network topology

Figure 1 shows a multi-domain OTN network with three domains. In this example, user wants to setup an end-to-end OTN service that passes through Domain-2. In order to create an OTN mux service in Domain-2, user will need to specify the exact details of the client side LO-ODU on NE2 and NE3, so that these service endpoints can be paired with the LO-ODU endpoints on NE1 and NE4, respectively.

Let's assume that ODU4 is the client side HO-ODU on NE2 and NE3, and the client signal is ODU2. User will need to specify the OTN client signal (ODU2 in this example), the Tributary Port Number (TPN), Tributary Slot Granularities (TSG) and timeslots to be used. As shown in the figure above, these service parameters must be the same between NE1 and NE2, and NE3 and NE4.

Once the OTN Mux service is setup in Domain-2, the incoming signal from either NE1 and/or NE4 will be switched inside Domain-2, and delivered to NE at the other end.

2.2. Model Tree

```

module: ietf-otn-service
augment /te:te/te:tunnels/te:tunnel/te:config:
  +--rw payload-treatment?    enumeration
  +--rw src-client-signal?    identityref
  +--rw src-tpn?              uint16
  +--rw src-tsg?              identityref
  +--rw src-timeslot-count?   uint16
  +--rw src-timeslots
  | +--rw values*            uint8
  +--rw dst-client-signal?    identityref
  +--rw dst-tpn?              uint16
  +--rw dst-tsg?              identityref
  +--rw dst-timeslot-count?   uint16
  +--rw dst-timeslots
  | +--rw values*            uint8
augment /te:te/te:tunnels/te:tunnel/te:state:
  +--ro payload-treatment?    enumeration
  +--ro src-client-signal?    identityref
  +--ro src-tpn?              uint16
  +--ro src-tsg?              identityref
  +--ro src-timeslot-count?   uint16
  +--ro src-timeslots
  | +--ro values*            uint8
  +--ro dst-client-signal?    identityref
  +--ro dst-tpn?              uint16
  +--ro dst-tsg?              identityref
  +--ro dst-timeslot-count?   uint16
  +--ro dst-timeslots
  | +--ro values*            uint8

```

2.3. OTN Service YANG Model

```
<CODE BEGINS> file "ietf-otn-service@2016-06-24.yang"
```

```
module ietf-otn-service {
```

```
yang-version 1;
namespace "urn:ietf:params:xml:ns:yang:ietf-otn-service";
prefix "otn-svc";

import ietf-te { prefix "te"; }
import ietf-transport-types { prefix "tran-types"; }
import yang-ext { prefix ext; revision-date 2013-07-09; }

organization
  "IETF CCAMP Working Group";

contact
  "WG Web: <http://tools.ietf.org/wg/ccamp/>
  WG List: <mailto:ccamp@ietf.org>

  Editor: Anurag Sharma
         <mailto:AnSharma@infinera.com>

  Editor: Rajan Rao
         <mailto:rrao@infinera.com>

  Editor: Xian Zhang
         <mailto:zhang.xian@huawei.com>";

description
  "This module defines a model for OTN Services.";

revision "2016-06-24" {
  description "Initial revision";
  reference "TBD";
}

grouping otn-tunnel-endpoint {
  description "Parameters for OTN service.";

  leaf payload-treatment {
    type enumeration {
      enum switching;
      enum transport;
    }
    default switching;
    description
      "Treatment of the incoming payload. Payload can
      either be switched, or transported as is.";
  }

  leaf src-client-signal {
    type identityref {
```

```
        base tran-types:client-signal;
    }
    description
        "Client signal at the source endpoint of
        the tunnel.";
}

leaf src-tpn {
    type uint16 {
        range "0..4095";
    }
    description
        "Tributary Port Number. Applicable in case of mux
        services.";
    reference
        "RFC7139: GMPLS Signaling Extensions for Control of
        Evolving G.709 Optical Transport Networks.";
}

leaf src-tsg {
    type identityref {
        base tran-types:tributary-slot-granularity;
    }
    description
        "Tributary slot granularity. Applicable in case of mux
        services.";
    reference
        "G.709/Y.1331, February 2012: Interfaces for the
        Optical Transport Network (OTN)";
}

leaf src-timeslot-count {
    type uint16;
    description
        "Number of timeslots used at the source.";
}

container src-timeslots {
    description
        "A list of tributary timeslots used by the
        client service. Applicable in case of mux
        services.";
    leaf-list values {
        type uint8;
        description
            "Tributary timeslot value.";
        reference
            "G.709/Y.1331, February 2012: Interfaces for the
```

```
        Optical Transport Network (OTN)";
    }
}

leaf dst-client-signal {
    type identityref {
        base tran-types:client-signal;
    }
    description
        "Client signal at the destination endpoint of
        the tunnel.";
}

leaf dst-tpn {
    type uint16 {
        range "0..4095";
    }
    description
        "Tributary Port Number. Applicable in case of mux
        services.";
    reference
        "RFC7139: GMPLS Signaling Extensions for Control of
        Evolving G.709 Optical Transport Networks.";
}

leaf dst-tsg {
    type identityref {
        base tran-types:tributary-slot-granularity;
    }
    description
        "Tributary slot granularity. Applicable in case of mux
        services.";
    reference
        "G.709/Y.1331, February 2012: Interfaces for the
        Optical Transport Network (OTN)";
}

leaf dst-timeslot-count {
    type uint16;
    description
        "Number of timeslots used at the destination.";
}

container dst-timeslots {
    description
        "A list of tributary timeslots used by the
        client service. Applicable in case of mux
        services.";
}
```

```
        leaf-list values {
            type uint8;
            description
                "Tributary timeslot value.";
            reference
                "G.709/Y.1331, February 2012: Interfaces for the
                Optical Transport Network (OTN)";
        }
    }
}

/*
Note: Comment has been given to authors of TE Tunnel model to add
tunnel-types to the model in order to identify the technology
type of the service.

grouping otn-service-type {
    description
        "Identifies the OTN Service type.";
    container otn-service {
        presence "Indicates OTN Service.";
        description
            "Its presence identifies the OTN Service type.";
    }
} // otn-service-type

augment "/te:te/te:tunnels/te:tunnel/te:tunnel-types" {
    description
        "Introduce OTN service type for tunnel.";
    ext:augment-identifier otn-service-type-augment;
    uses otn-service-type;
}
*/

/*
Note: Comment has been given to authors of TE Tunnel model to add
list of endpoints under config to support P2MP tunnel.
*/
augment "/te:te/te:tunnels/te:tunnel/te:config" {
    description
        "Augment with additional parameters required for OTN
        service.";
    ext:augment-identifier otn-tunnel-endpoint-config-augment;
    uses otn-tunnel-endpoint;
}

augment "/te:te/te:tunnels/te:tunnel/te:state" {
    description
```

```

        "Augment with additional parameters required for OTN
        service.";
    ext:augment-identifier otn-tunnel-endpoint-state-augment;
    uses otn-tunnel-endpoint;
}

/*
Note: Comment has been given to authors of TE Tunnel model to add
tunnel-lifecycle-event to the model. This notification is reported
for all lifecycle changes (create, delete, and update) to the
tunnel or lsp.
augment "/te:tunnel-lifecycle-event" {
    description
        "OTN service event";
    uses otn-service-type;
    uses otn-tunnel-params;
    list endpoint {
        key
            "endpoint-address tp-id";
        description
            "List of Tunnel Endpoints.";
        uses te:tunnel-endpoint;
        uses otn-tunnel-params;
    }
}
*/
}

```

<CODE ENDS>

2.4. Transport Types YANG Model

```

<CODE BEGINS> file "ietf-transport-types@2016-06-24.yang"

module ietf-transport-types {
    yang-version 1;
    namespace "urn:ietf:params:xml:ns:yang:ietf-transport-types";
    prefix "tran-types";

    organization
        "IETF CCAMP Working Group";
    contact
        "WG Web: <http://tools.ietf.org/wg/ccamp/>
        WG List: <mailto:ccamp@ietf.org>

        Editor: Anurag Sharma
               <mailto:AnSharma@infinera.com>

```

```
    Editor: Rajan Rao
           <mailto:rrao@infinera.com>

    Editor: Xian Zhang
           <mailto:zhang.xian@huawei.com>";

description
    "This module defines transport types.";

revision "2016-06-24" {
    description "Initial revision";
    reference "TBD";
}

identity tributary-slot-granularity {
    description
        "Tributary slot granularity.";
    reference
        "G.709/Y.1331, February 2012: Interfaces for the
        Optical Transport Network (OTN)";
}

identity tsg-1.25G {
    base tributary-slot-granularity;
    description
        "1.25G tributary slot granularity.";
}

identity tsg-2.5G {
    base tributary-slot-granularity;
    description
        "2.5G tributary slot granularity.";
}

identity tributary-protocol-type {
    description
        "Base identity for protocol framing used by
        tributary signals.";
}

identity prot-OTU1 {
    base tributary-protocol-type;
    description
        "OTU1 protocol (2.66G)";
}

identity prot-OTU1e {
    base tributary-protocol-type;
```

```
        description
            "OTU1e protocol (11.04G)";
    }

    identity prot-OTU2 {
        base tributary-protocol-type;
        description
            "OTU2 protocol (10.70G)";
    }

    identity prot-OTU2e {
        base tributary-protocol-type;
        description
            "OTU2e protocol (11.09G) for 10G LAN PHY";
    }

    identity prot-OTU2f {
        base tributary-protocol-type;
        description
            "OTU2f protocol (11.32G) for transporting a 10
            fiber channel.";
    }

    identity prot-OTU3 {
        base tributary-protocol-type;
        description
            "OTU3 protocol (43.01G)";
    }

    identity prot-OTU3e {
        base tributary-protocol-type;
        description
            "OTU3e protocol (44.57G) for transporting four OTU2e
            signals.";
    }

    identity prot-OTU3e2 {
        base tributary-protocol-type;
        description
            "OTU3e2 protocol (44.58G).";
    }

    identity prot-OTU4 {
        base tributary-protocol-type;
        description
            "OTU4 protocol (112G) for transporting 100GE
```

```
        signal.";
    }

    identity prot-OTUCn {
        base tributary-protocol-type;
        description
            "OTUCn protocol (beyond 100G) for transporting
            more than 100G signals.";
    }

    identity prot-ODU0 {
        base tributary-protocol-type;
        description
            "ODU0 protocol (1.24G).";
    }

    identity prot-ODU1 {
        base tributary-protocol-type;
        description
            "ODU1 protocol (2.49G).";
    }

    identity prot-ODU1e {
        base tributary-protocol-type;
        description
            "ODU1e protocol (10.35G).";
    }

    identity prot-ODU2 {
        base tributary-protocol-type;
        description
            "ODU2 protocol (10.03G).";
    }

    identity prot-ODU2e {
        base tributary-protocol-type;
        description
            "ODU2e protocol (10.39G).";
    }

    identity prot-ODU3 {
        base tributary-protocol-type;
        description
            "ODU 3 protocol (40.31G).";
    }

    identity prot-ODU3e2 {
        base tributary-protocol-type;
```

```
        description
            "ODU3e2 protocol (41.78G).";
    }

    identity prot-ODU4 {
        base tributary-protocol-type;
        description
            "ODU4 protocol (104.79G).";
    }

    identity prot-ODUFlex-cbr {
        base tributary-protocol-type;
        description
            "ODU Flex CBR protocol for transporting constant bit
            rate signal.";
    }

    identity prot-ODUFlex-gfp {
        base tributary-protocol-type;
        description
            "ODU Flex GFP protocol for transporting stream
            of packets using Generic Framing Procedure.";
    }

    identity prot-ODUCn {
        base tributary-protocol-type;
        description
            "ODUCn protocol (beyond 100G).";
    }

    identity prot-1GbE {
        base tributary-protocol-type;
        description
            "1G Ethernet protocol";
    }

    identity prot-10GbE-LAN {
        base tributary-protocol-type;
        description
            "10G Ethernet LAN protocol";
    }

    identity prot-40GbE {
        base tributary-protocol-type;
        description
            "40G Ethernet protocol";
    }
}
```

```
identity prot-100GbE {
    base tributary-protocol-type;
    description
        "100G Ethernet protocol";
}

identity client-signal {
    description
        "Base identity from which specific client signals
        for the tunnel are derived.";
}

identity client-signal-1GbE {
    base client-signal;
    description
        "Client signal type of 1GbE";
}

identity client-signal-10GbE-LAN {
    base client-signal;
    description
        "Client signal type of 10GbE LAN";
}

identity client-signal-10GbE-WAN {
    base client-signal;
    description
        "Client signal type of 10GbE WAN";
}

identity client-signal-40GbE {
    base client-signal;
    description
        "Client signal type of 40GbE";
}

identity client-signal-100GbE {
    base client-signal;
    description
        "Client signal type of 100GbE";
}

identity client-signal-OC3_STM1 {
    base client-signal;
    description
        "Client signal type of OC3 and STM1";
}
```

```
identity client-signal-OC12_STM4 {
    base client-signal;
    description
        "Client signal type of OC12 and STM4";
}

identity client-signal-OC48_STM16 {
    base client-signal;
    description
        "Client signal type of OC48 and STM16";
}

identity client-signal-OC192_STM64 {
    base client-signal;
    description
        "Client signal type of OC192 and STM64";
}

identity client-signal-OC768_STM256 {
    base client-signal;
    description
        "Client signal type of OC768 and STM256";
}

identity client-signal-OTU1 {
    base client-signal;
    description
        "Client signal type of OTU1 (2.66G)";
}

identity client-signal-OTU2 {
    base client-signal;
    description
        "Client signal type of OTU2 (10.70G)";
}

identity client-signal-OTU2e {
    base client-signal;
    description
        "Client signal type of OTU2e (11.09G)";
}

identity client-signal-OTU2f {
    base client-signal;
    description
        "Client signal type of OTU2f (11.32G)";
}
```

```
identity client-signal-OTU3 {
    base client-signal;
    description
        "Client signal type of OTU3 (43.01G)";
}

identity client-signal-OTU3e {
    base client-signal;
    description
        "Client signal type of OTU3e (44.58G)";
}

identity client-signal-OTU4 {
    base client-signal;
    description
        "Client signal type of OTU4 (112G)";
}

identity client-signal-OTUCn {
    base client-signal;
    description
        "Client signal type of OTUCn (beyond 100G)";
}

identity client-signal-ODU0 {
    base client-signal;
    description
        "Client signal type of ODU0 (1.24G)";
}

identity client-signal-ODU1 {
    base client-signal;
    description
        "ODU1 protocol (2.49G)";
}

identity client-signal-ODU2 {
    base client-signal;
    description
        "Client signal type of ODU2 (10.03G)";
}

identity client-signal-ODU2e {
    base client-signal;
    description
        "Client signal type of ODU2e (10.39G)";
}
```

```
identity client-signal-ODU3 {
    base client-signal;
    description
        "Client signal type of ODU 3 (40.31G)";
}

identity client-signal-ODU3e2 {
    base client-signal;
    description
        "Client signal type of ODU3e2 (41.78G)";
}

identity client-signal-ODU4 {
    base client-signal;
    description
        "Client signal type of ODU4 (104.79G)";
}

identity client-signal-ODUFlex-cbr {
    base client-signal;
    description
        "Client signal type of ODU Flex CBR";
}

identity client-signal-ODUFlex-gfp {
    base client-signal;
    description
        "Client signal type of ODU Flex GFP";
}

identity client-signal-ODUCn {
    base client-signal;
    description
        "Client signal type of ODUCn (beyond 100G).";
}

identity client-signal-FC400 {
    base client-signal;
    description
        "Client signal type of Fibre Channel FC400.";
}

identity client-signal-FC800 {
    base client-signal;
    description
        "Client signal type of Fibre Channel FC800.";
}
```

```
identity client-signal-FICON-4G {
    base client-signal;
    description
        "Client signal type of Fibre Connection 4G.";
}

identity client-signal-FICON-8G {
    base client-signal;
    description
        "Client signal type of Fibre Connection 8G.";
}
}

<CODE ENDS>
```

3. Security Considerations

TBD

4. IANA Considerations

TBD

5. Acknowledgements

6. Normative References

- [G.709] ITU-T, "Interfaces for the Optical Transport Network (OTN), G.709/Y.1331 Recommendation", February 2012.
- [RFC6020] Bjorklund, M., Ed., "YANG - A Data Modeling Language for the Network Configuration Protocol (NETCONF)", RFC 6020, DOI 10.17487/RFC6020, October 2010, <<http://www.rfc-editor.org/info/rfc6020>>.
- [RFC7139] Zhang, F., Ed., Zhang, G., Belotti, S., Ceccarelli, D., and K. Pithewan, "GMPLS Signaling Extensions for Control of Evolving G.709 Optical Transport Networks", RFC 7139, DOI 10.17487/RFC7139, March 2014, <<http://www.rfc-editor.org/info/rfc7139>>.

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