                    A Yang model for I2RS service topology
                     draft-hares-i2rs-service-topo-dm-03.txt

Abstract

   This document defines I2RS protocol-independent service layer virtual
   topology data model. This data model utilizes the concepts in the
   generic I2RS topology model of virtual networks (node, links,
   termination points) and cross-layer topologies. This virtual service
   topology may be a composite layer created from the combination of
   protocol-dependent service layers. Protocol-dependent services
   layers include: L3VPN, L2VPN, EVPN, E-Tree, and others.

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1. Introduction

   Service topology in [I-D.ietf-i2rs-yang-network-topo] includes the a
   virtual topology for a service layer above the L1, L2, and L3 layers.
   This virtual topology has the generic topology elements of node,
   link, and terminating point. The virtual service topology is a
   network-wide topology stored on one routing system which an I2RS
   agent is connected to.

   The virtual service topology is a composite of the available services
   topologies IETF has standard virtual network topologies for L3VPN,
   L2VPN, and EVPN services, E-TREE services, Seamless MPLS topologies
   within an As and others. This yang module provides the composite
   protocol independent service topology that these protocol dependent
   topologies plug into

1.1. Conventions used in this document

   The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
   "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
   document are to be interpreted as described in RFC2119 [RFC2119].

1.2. Base Model: the Service-Topology Component

   The following diagram contains an informal graphical depiction of the
   main elements of the information model:

```
                  +----------------+
                  |    network     |
                  |    topology    |<...
                  +----------------+    :
                     *          *   :    :
                     |          |   :...:
                     |          |
               +--------+     +--------+
        ...>|  node  |<.......|link    |<...
         :     +--------+<.......+--------+   :
         :     :    *          : :   *   :    :
         :.....     |          : :   |  :...:
                    |          : :   |
        .....>+--------+<........: :   |
         :     |   TP   |<..........:   |
         :  ...>+--------+               |
         : :                            |
         : : ....................+---------+
        ......................|Direction|
                              +---------+
```
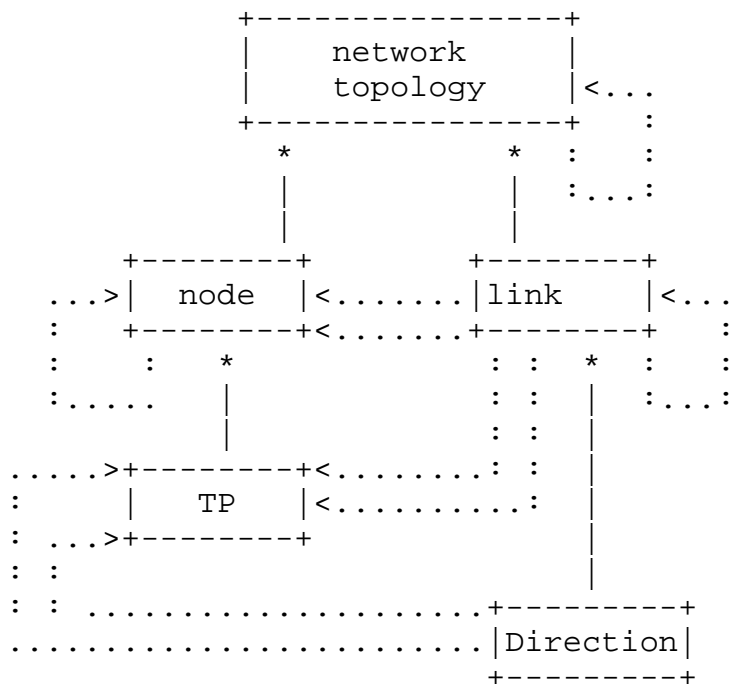
2. High level Yang architecture

   This section describes the Yang High level architecture.

2.1. Network level

   The service topology network level defines the following high-level
   yang architeture:

   module: i2rs-service-topologies
      augment /nw:network/nw:network-types:
         +--rw service-topologies-types
      augment /nw:network:
        +--rw service-topology-attributes
           +--rw name?   string
                  +--rw flag   flag_type;
                  +--rw composite-flag identity-ref
                  +--rw service-topo-id network-id
                  +--rw node-count uint32
                  +--rw composite-flag_status identity-ref

   The service topology attributes for a network include the following

      name - name of the service topology,

      flag - generic topology flag,

composite-flags - bit mask with flags of service layer topologies
network topology node available to create service topology from.
These topologies include: L3VPN, L2VPN, and EVPN services, E-TREE
services, Seamless MPLS topologies within an AS and others.

service-topo-id - service topology identifier.

node-count - count of nodes in composite service topology,

composite-flag_status - status flag for each of the composite
topologies on whether portions of the topology are included in the
composite.

2.2. Node level

```
module: i2rs-service-topologies
....
    augment /nw:network/nw:node
       +--rw node-service-attributes
          +--rw name?          inet:domain-name
          +--rw composite_flag*  identityref;
                 +--rw service-node-id  uint32
                 +--rw node-svc_status* identityref;
```

The additional fields in the service attributes are the following:

name - name of network node,

flag - generic topology node flag,

service-node-id - the id for the service node in the composite
network,

node-svc-type - the type of service node. The service node can be
a member of one of the existing topology type (L3VPN, L2VPN, EVPN,
E-TREE, Seamless MPLS, MPLS-TE, MPLS node, or I2RS created).

2.3. Service Link and Termination point

```
    augment /nw:network/nt:link:
       +--rw service-link-attributes
          +--rw name?      string
          +--rw svc-link-type identityref
          +--rw metric?    uint32
    augment /nw:network/nw:node/nt:termination-point:
       +--rw service-termination-point-attributes
             +--rw tp-svc-id
          +--rw (supporting-termination-point) ()
             +--:(service)
                         | +--rw service-network-id  leafref
             | +--rw service-node-id     leafref
                         | +--rw service-tp-id       leafref
                       +--:(ip)
                         | +--rw ip-address   inet:ip-address
             +--:(unnumbered)
                +--rw unnumbered-id?    uint32
```

The augmentation to the service topology is the service link
attributes which include:

   name - name of the link,

   svc-link-type - the service link type used to create this
   composite service link.

   metric - the metric of the service type

The augmentation to the termination point include the following

   tp-svc-id - service id for the termination point,

   supporting termination point* - with a)references to the service
   network id, node id and termination point for service id, or b) an
   ip address, or c) an unnumbered link address

3. Yang Data Model

   <CODE BEGINS> file "ietf-i2rs-service-topology@2016-01-03.yang"
      module ietf-i2rs-service-topology{
    namespace "urn:ietf:params:xml:ns:yang:ietf-i2rs-service-topology";
    prefix i2rs-st;

      import ietf-inet-types {
      prefix inet;
    }

      import ietf-network {

```
      prefix nw;
    }
   import ietf-network-topology {
     prefix "nt";
   }

    organization "IETF";
          contact
     "email: shares@ndzh.com;
      email: linda.dunbar@huawei.com;
          ";

   description
     "This module defines a model for the service topology.";

  revision 2016-01-03{
    description
      "Version 1 - initial version;
           Version 2 - yang format fixed;
           version 3 - error in xml file";

    reference "draft-hares-i2rs-service-topo-dm-01.txt";
  }

      identity svc-topo-flag-identity {
        description "Base type for svc flags";
        }
      identity l3vpn-svc-topo {
        base svc-topo-flag-identity;
        description "L3VPN service type";
       }
      identity l2vpn-svc-topo {
        base svc-topo-flag-identity;
        description "L2VPN service type";
       }
       identity EVPN-svc-topo {
        base svc-topo-flag-identity;
        description "EVPN service type";
       }
        identity Seamless-MPLS-svc-topo {
        base svc-topo-flag-identity;
        description "Seamless MPLS service type";
       }
        identity Etree-svc-topo {
        base svc-topo-flag-identity;
        description "Seamless MPLS service type";
       }
        identity I2rs-svc-topo {
```

```
            base svc-topo-flag-identity;
            description "I2RS create service topo";
           }

         identity svc-tp-type {
           description "Base type for service
             termination-point type flags";
           }
         identity svc-tp-type-service {
           base svc-tp-type;
           description "service type";
          }
         identity svc-tp-type-ip {
           base svc-tp-type;
           description "service IP";
          }
         identity svc-tp-type-unnum {
                   base svc-tp-type;
           description "service unnumbered link";
          }

             identity service-topology-types{
              description
                  "service topology type";
             }

         grouping service-topology-types {
          leaf service-type {
              type identityref {
              base svc-topo-flag-identity;
             }
             description "list of service
                      topology type supported";
           }
                    description
                   "service topology types";
         }

         grouping service-topology-attributes {
               leaf name {
                            type string;
                 description "name of service
                      topology";
                         }
               leaf composite-flag {
                 type identityref {
                     base service-topology-types;
                                }
```

```
                    description "other topologies
                    this topology is configured to
                    be a composite of
                    (L3VPN, L2VPN, I2RS only)";
                 }
               leaf service-topo-id {
                   type nw:network-id;
                    description  "service topology id
                                       to a service
                                         topology instance.";
                }
                leaf service-id-number {
                   type uint32;
                   description "ID for topology";
                }
               leaf node-count {
                   type uint32;
                   description "count of service level nodes
                    in the network.";
                 }
               leaf composite-flag-status {
                  type identityref {
                    base svc-topo-flag-identity;}
                   description "other topologies
                   this topology is currently a
                    composite of
                   (L3VPN, L2VPN, I2RS only)";
                }
                   description  "Group of attributes for
               service topology";
         }

       grouping node-svc-attribute {
          leaf domain-name{
             type inet:domain-name;
             description "Domain name for node";
          }
          leaf composite-flag {
            type identityref {
               base svc-topo-flag-identity;
                     }
            description "virtual network
             node can be composite of the
             topologies list
             (L3VPN, L2VPN, I2RS only)";
             }
          leaf service-node-id {
             type uint32;
```

```
              description "ID for node at
                service level";
          }
          leaf node-svc_status {
             type identityref {
               base service-topology-types;
                     }
             description "other topologies
               this topology is currewntly
               be composed of
                         (L3VPN, L2VPN, I2RS only)";
          }
             description
             "grouping of composite flag";
         }


          grouping service-link-attributes {
          leaf name {
                   type string;
            description "name of
              service link";
                   }
          leaf link-id {
                   type uint32;
                   description "link id";
                 }
          leaf svc-link-type {
            type identityref {
               base service-topology-types;
                     }
            description "other topologies
              this link is current a
                         composite of
              (L3VPN, L2VPN, I2RS only)";
          }
          leaf metric {
            type uint32;
            description "link metric
                     which may need to expand or
                          link to TE topologies.";
          }
             description "grouping of
                 service link attribute";
         }

      grouping service-termination-point-attributes {
          leaf svc-tp-id {
```

```
                type uint32;
                description "termination point id";
            }
        container supporting-termination-point {
          leaf svc-tp-type {
            type identityref {
              base svc-tp-type;
                        }
          description "other topologies
            this link termination point is
            part of (L3VPN, L2VPN,
                    or I2RS only)";
                }
          choice svc-tp-support-type{
            case svc-tp-type-service {

              leaf service-network-id {
                type uint32;
                description "service network id";
                        }
              leaf service-node-id {
                type uint32;
                                description "service node id";
                        }
              leaf service-link-id {
                type uint32;
                                description "service link id";
                        }
                        description "network, node,
              tp that supports this
              termination point";
                        }
            case svc-tp-type-inet {
              leaf ip-address{
                            type inet:ip-address;
                            description "ip address";
                        }
                        description "inet svc tp";
            }

                    case svc-tp-type-unnum {
              leaf unnumbered-id {
                type uint32;
                            description "unnumbered id";
                        }
                     description "unnumber svc tp";
                        }
                description "service termination
```

```
                            point type cases";
         }
       description "container of
             supporting termination point";
       }
               description
               "grouping of service-termination-point-attributes";
     }


       /*
        * Data nodes
        */
           augment "/nw:networks/nw:network/nw:network-types"{
       uses service-topology-types;
               description
               "augment the network-tpyes with
               the service-topology-types grouping";
               }
       augment "/nw:networks/nw:network/nw:node" {
           leaf name {
           type inet:domain-name;
            description "service name.";
           }
           list composite_fag {
             key "service-node-id";
             leaf service-node-id{
               type uint32;
               description "service node id.";
             }
             leaf node-svc-type{
               type string;
               description "node service type.";
             }
           leaf-list next-hop{
             type uint32;
             description "next hop id.";
           }
           description
             "the list of composite flag.";
          }

         description "augments node list";
         }


     augment "/nw:networks/nw:network"{
```

```
         uses service-topology-attributes;
            description
            "augment the network with
            the servcie-topolgoy-attributes";
            }
    augment "/nw:networks/nw:network/nw:node"{
       uses node-svc-attribute;
          description
          "augment the node with the node-svc-attribute";
          }
    augment "/nw:networks/nw:network/nt:link" {
      uses service-link-attributes;
         description
         "augment the link with
         service-link-attributes";
         }
   augment "/nw:networks/nw:network/nw:node/nt:termination-point"{
      uses service-termination-point-attributes;
         description
         "augment the termination-point with
         service-termination-point-attributes";
         }
   } // module i2rs-service-topology
   <CODE ENDS>
```

4. IANA Considerations

   TBD

5. Security Considerations

   TBD

6. References

6.1. Normative References

   [I-D.ietf-i2rs-yang-network-topo]
            Clemm, A., Medved, J., Varga, R., Tkacik, T., Bahadur, N.,
            and H. Ananthakrishnan, "A Data Model for Network
            Topologies", draft-ietf-i2rs-yang-network-topo-02 (work in
            progress), December 2015.

   [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate
            Requirement Levels", BCP 14, RFC 2119,
            DOI 10.17487/RFC2119, March 1997,
            <http://www.rfc-editor.org/info/rfc2119>.

6.2. Informative References

   [I-D.ietf-i2rs-yang-l3-topology]
              Clemm, A., Medved, J., Varga, R., Tkacik, T., Liu, X.,
              Bryskin, I., Guo, A., Ananthakrishnan, H., Bahadur, N.,
              and V. Beeram, "A YANG Data Model for Layer 3 Topologies",
              draft-ietf-i2rs-yang-l3-topology-01 (work in progress),
              December 2015.

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