

I2RS
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S. Hares
Hickory Hill Consulting
L. Dunbar
Huawei
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A Yang model for I2RS service topology
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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.

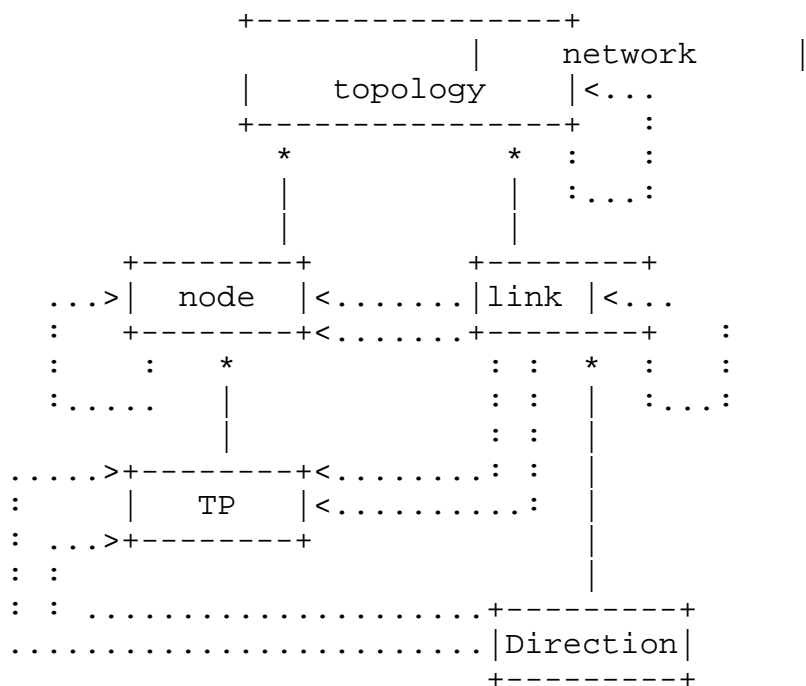
The virtual service topology is a composite of the available services topologies IETF has standard virtual network topologies for L3VPN, L2VPN, and EVPN services, E-TREE services, Seamless MPLS topologies within an As and others. This yang module provides the composite protocol independent service topology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



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 architecture:

```

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 "i2rs-service-topology@2015-07-07.yang"
module i2rs-service-topology {
  yang-version 1;
  namespace "urn:ietf:params:xml:ns:yang:i2rs-service-topology";
  prefix "i2rs-st";
  import ietf-network {
    prefix "nw";
  }
  import ietf-network-topology {

```

```
    prefix "nt";
  }
import ietf-inet-types {
  prefix "inet";
}
organization "TBD";
contact "TBD";

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

revision "2015-07-07" {
  description "Initial revision";
  reference "TBD";
}

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

grouping service-topology attributes {
    description
        "Grouping for the attribute for the
        service topology";
    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 leafref {
            path "/nw:network/nw:network-id"
```

```

    }
    description
    "An absolute reference to a network topology instan
ce."
}
leaf service-id-number {
    type uint32;
    description "ID for topology";
}
leaf node-node {
    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)"
}
}

grouping node-svc-attribute {
    leaf 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 a composite of
(L3VPN, L2VPN, I2RS only)"
    }
}

```



```

    }
}

grouping service-link-attributes {
  leaf name {type string;
    description "name of
      service link";}
  leaf link-id uint32;
  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";
    // may need to expand with TE topologies
  }
}

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, I2RS only)"
    }
    choice svc-tp-type
      case svc-tp-type-service {
        description "network, node,
          tp that supports this
          termination point"
        leaf service-network-id {
          type uint32; }
        leaf service-node-id {
          type uint32;}
        leaf service-link-id {
          type uint32;}
      }
  }
}

```

```

        case svc-tp-type-inet {
            leaf ip-address inet:ip-addresss;
        }
        case svc-tp-type-unnum {
            leaf unnumbered-id {
                type uint32;}}
        }
    }

    augment /nw:network/nw:node
+--rw node-svc-attributes
  +--rw name?          inet:domain-name
  +--rw composite_flag* flag-type
    +--rw service-node-id uint32
    +--rw node-svc-type service-type
    +--rw next-hop      [next-hop-id]

augment /nw:network/nw:network-types
  use service-topology-types
augment /nw:network/nw:network
  use service-topology-attributes

augment /nw:network/nw:node
  use node-svc-attribute

augment /nw:network/nt:link:
  uses service-link-attributes

augment /nw:network/nw:node/nt:termination-point:
  uses service-termination-point-attributes
} // module i2rs-service-topology
<CODE BEGINS>

```

4. IANA Considerations

TBD

5. Security Considerations

TBD

6. Normative 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-00 (work in progress), June 2015.

[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-01 (work in progress), June 2015.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC5511] Farrel, A., "Routing Backus-Naur Form (RBNF): A Syntax Used to Form Encoding Rules in Various Routing Protocol Specifications", RFC 5511, April 2009.

Authors' Addresses

Susan Hares
Hickory Hill Consulting
7453 Hickory Hill
Saline, MI 48176
USA

Email: shares@ndzh.com

Linda Dunbar
Huawei
USA

Email: linda.dunbar@huawei.com