

# A Layer 3 VPN Network Yang model

draft-ietf-opsawg-l3sm-l3nm-01

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**OPSAWG**

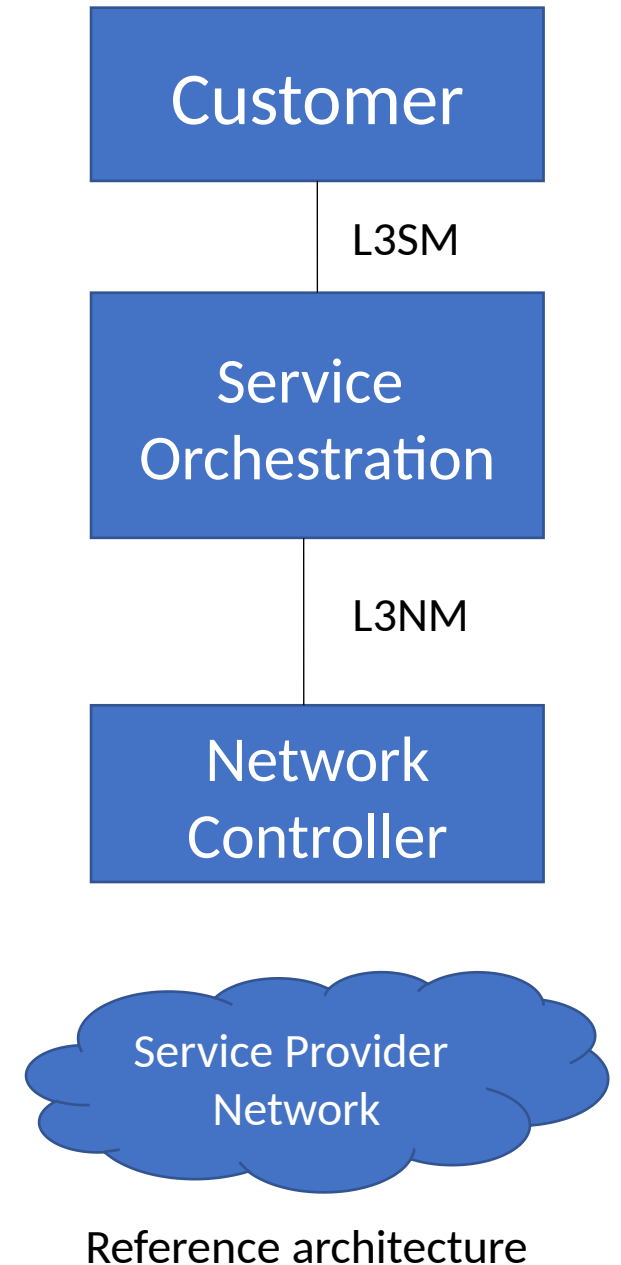
20<sup>th</sup> November 2019,

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# L3NM Motivation

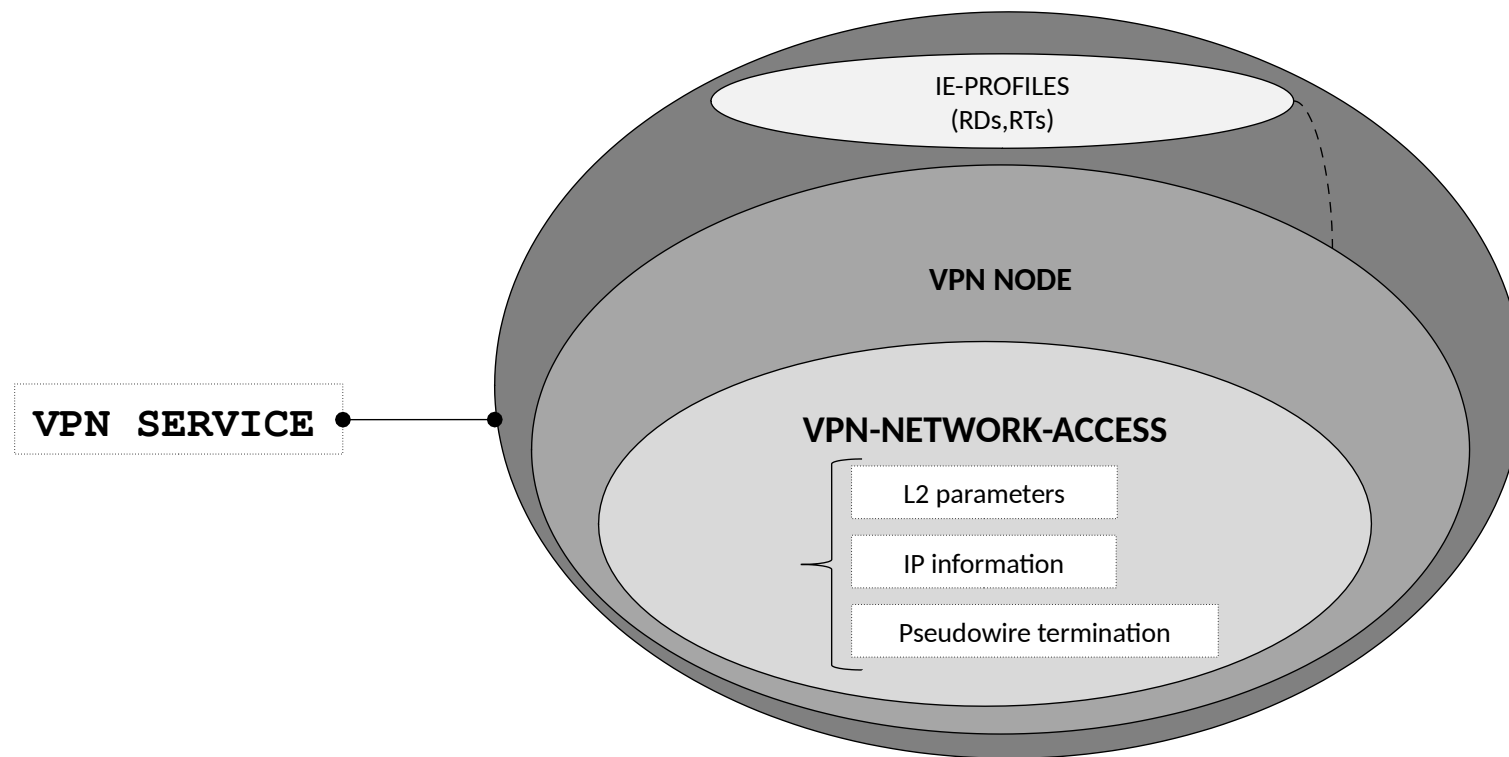
- Requirements by Network Operators:
  - Provide a Yang module to manage L3 VPNs Services in a Service Provider Network
  - The Yang module needs to be exposed by a Network Controller (the functional component in charge of the service provider network)
  - It is consumed by the Network Operator (for example, by a Service Orchestrator)
  - It should be possible to allocate explicitly the logical resources such as RT/RD, or have them auto-assigned by the controller.
  - The Network controller will not directly contact customer.
- Existing work:
  - L3SM: Describes the requirements of a L3 VPN that interconnects a set of sites from the point of view of the customer. The customer service model does not provide details on the Service Provider Network. The L3 VPN Customer. Service model is defined in [RFC8299].
- L3NM (this work):
  - A YANG module that manages the VPN Services in a Service Provider Network.
  - It contains information of the Service Provider network and might include allocated logical resources. It can be used by network controllers to manage and control the VPN Service configuration in the Service Provider network.
  - The YANG module can be consumed to request/modify/delete a L3 VPN Service to a Network controller.
  - Does not include customer-related information



# Updates in -01 Version

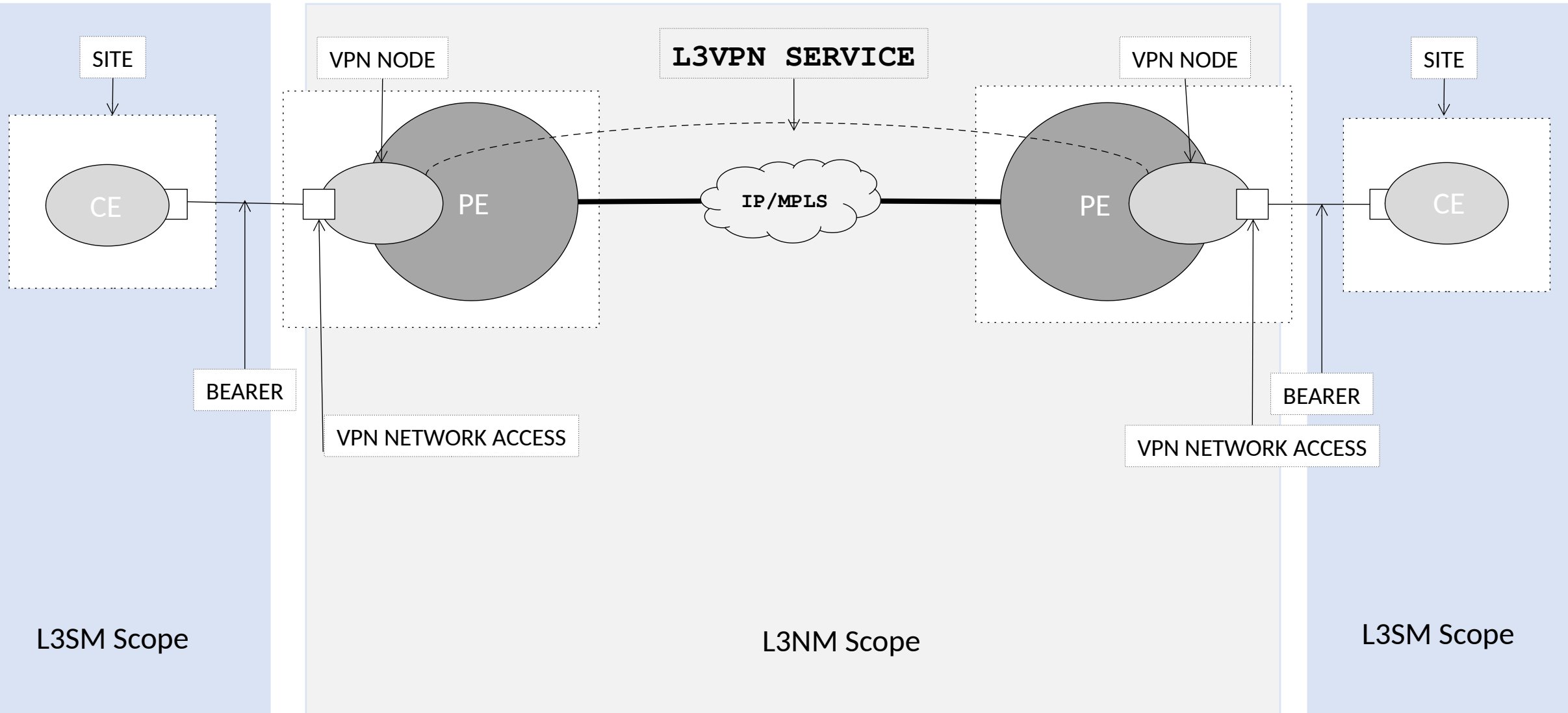
- Working group document (now <https://tools.ietf.org/html/draft-ietf-opsawg-l3sm-l3nm-01>)
- New contributors: We welcome Med Boucadair and Stephane Litkowski, both providing their great expertise in L3 VPNs and experience from the L3SM work.
- Editorial issues from Tom Petch's review fixed ( see <https://www.mail-archive.com/opsawg@ietf.org/msg03834.html> )
- Implementations status section completed with three Implementations: Nokia, Huawei and Infinera.
- Yang model updated.
  - moving from from “site-centric” view to “network-centric” view.
  - Yang model Prune: All customer related parameters that are not necessary for the vpn service creation have been removed. Unused containers coming from L3SM are removed.
- A examples section has been added to understand how the model can be used. In this version, authors have started by including a simple, but widely used in Service Providers, example. Future versions will include more complex examples.
- Terminology: In order to help readers understand correctly the model, the terminology section has been revisited and completed.
- Routing protocols: rocess ID in OSPF radded.
- Description of the Yang model: The description of the model has been extended in order to allow implementors and users of the model to understand its use and avoid unambiguities.
- Relation with other Yang models. This section points which models are related to l3nm.
- Security section completed. Potential threats from malicious or unauthorized clients are identified.
- References have been updated and reorganized between normative and informative.

# New VPN Network model hierarchy



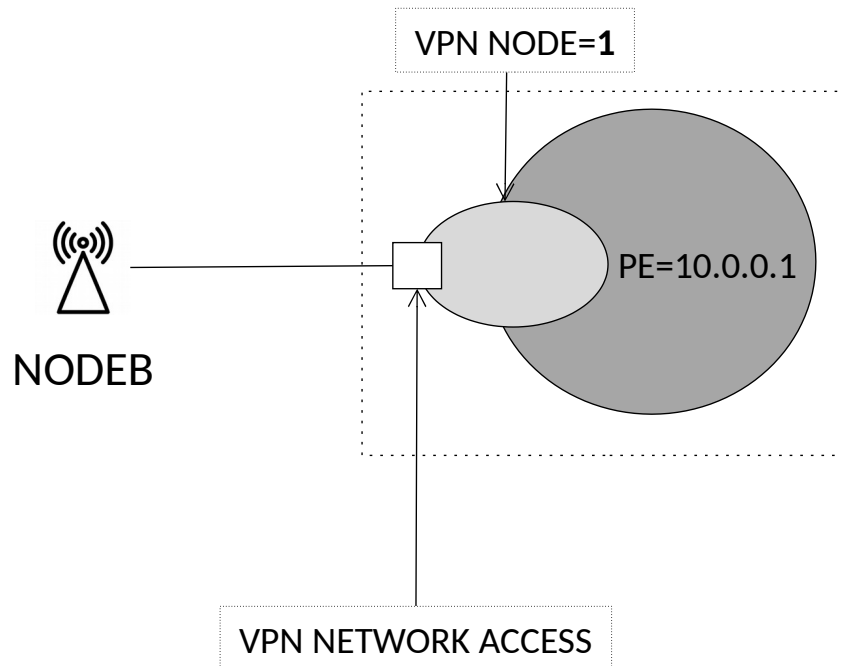
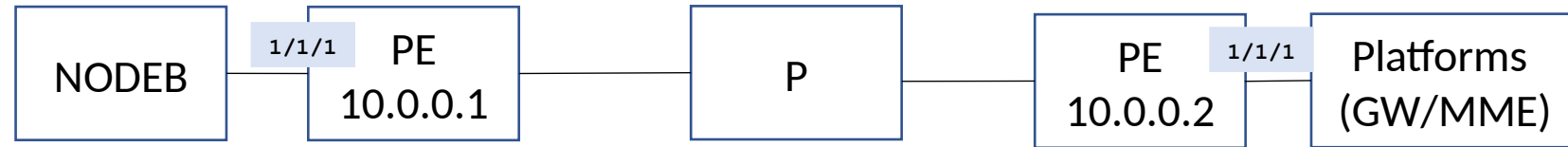
- Old hierarchy: main containers vpn\_service, site and vpn\_profiles.
- New hierarchy: only vpn\_services and vpn\_profiles.
- Site disappears as it is an information relevant for the service orchestration which consumes l3sm. In this model, aimed at managing vpn services in a network controller, the site is not needed.

# L3NM & L3SM



# Example: 4G VPN Provisioning

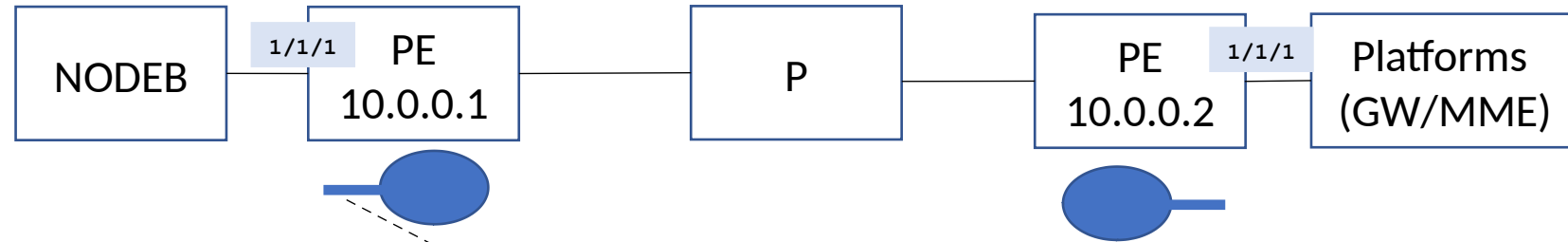
“I want a L3 VPN Service, with a vpn-node in PE with id 10.0.0.1 and Vpn-network-Access 1/1/1 and a vpn-node in PE with id 10.0.0.2 and Vpn-network-Access 1/1/1”



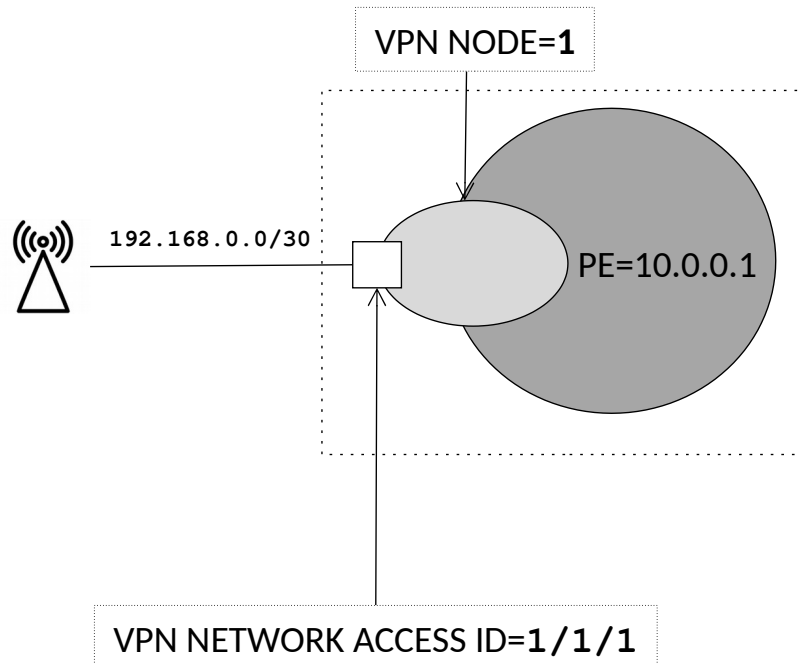
```
<vpn-nodes>
  <vpn-node>
    <vpn-node-id>1</vpn-node-id>
    <ne-id>10.0.0.1</ne-id>
    <autonomous-system>65000</autonomous-system>
    <description>4G</description>
    <router-id>10.0.0.1</router-id>
    <address-family>ipv4</address-family>
    <node-role>any-to-any-role</node-role>
    <rd>65001:1</rd>
  </vpn-node>
</vpn-nodes>
```

# Example: 4G VPN Provisioning (I)

“I want the Vpn-network-Access 1/1/1 without any routing protocol and with the IP 10.168.0.1”



```
<vpn-network-accesses>
  <vpn-network-access>
    <vpn-network-access-id>1/1/1</vpn-network-access-id>
    <description>4G</description>
    <status>
      <admin-enabled>true</admin-enabled>
    </status>
    <vpn-network-access-type>point-to-point</vpn-network-access-type>
    <ip-connection>
      <ipv4><address-allocation-type>static-address</address-allocation-type>
        <static-addresses>
          <primary-address>1</primary-address>
          <address>
            <address-id>1</address-id>
            <provider-address>192.168.0.1</provider-address>
            <customer-address>192.168.0.2</customer-address>
            <prefix-length>30</prefix-length>
          </address>
        </static-addresses></ipv4>
      </ip-connection>
      <routing-protocols>
        <routing-protocol>
          <id>1</id>
          <type>direct</type>
        </routing-protocol>
      </routing-protocols>
    </vpn-network-access>
  </vpn-network-accesses>
```





# Open issues (I): RT/RD Auto assignment

- There are several deployment scenarios
- Three possible behaviors are needed to fulfil the identified use cases:
  - The network controller auto-assigns logical resources (RTs, RDs)
  - The Network Operator/Service orchestrator assigns explicitly the RTs and RDs
  - The Network Operator/Service orchestrator explicitly wants NO RT/RD to be assigned
- In current version of the draft RT&RD are optional
  - The draft assumes if RT&RD are not filled, they will be assigned by the network controller. The assigned values will be available to read.
- Questions to WG
  - Is a “auto-assign” flag useful or it is redundant?
  - Can we assume that if an optional parameter is not filled, it MUST be calculated by the server?

# Open issues (II)

- Clarify if Extranet-VPNs from L3SM are NOT needed in L3NM
  - Can extranet-VPNs be mapped into Import/Export profiles?
- Review VPN Profiles
  - So far, operators involved have found QoS profile of interest. However, as the rest of profiles are available in L3SM, in sake of guarantee of translating L3SM requirements, must bfd-profile, cloud-identifier and routing profiles be maintained?
- Review Multicast
  - Currently, requirements from L3SM are directly mapped
- Relation with network topology
  - Currently ne-id is used to identify the network node in which vpn\_node is required.
  - Can we add a leafref in vpn\_node to a node in an ietf-network module?
    - A leafref might be unambiguous.
    - But will require to use the model together with ietf-network.
    - Choice with ne-id or leafref?

## Port identification in vpn-network-access

- Currently, the vpn-network-access is only identified by a vpn-network-access-id
- A bearer reference is also included
- Can we add a leafref to the UNI interface in a topology?
- Current topology models do not expose UNI interface

# Next Steps

- Authors ask WG to review current version of the document
- Authors ask implementors for feedback on the use of the model
- Solve open issues
  - Autoassignment of logical resources (RT/RD) in controller
  - Relation with topology model
- Extend work to L2NM
- Create topology model with UNI interfaces to attach vpn-network-accesses