Joint Optimal Service Chain Allocation, VNF instantiation and Metro Network Resource Management Demonstration.

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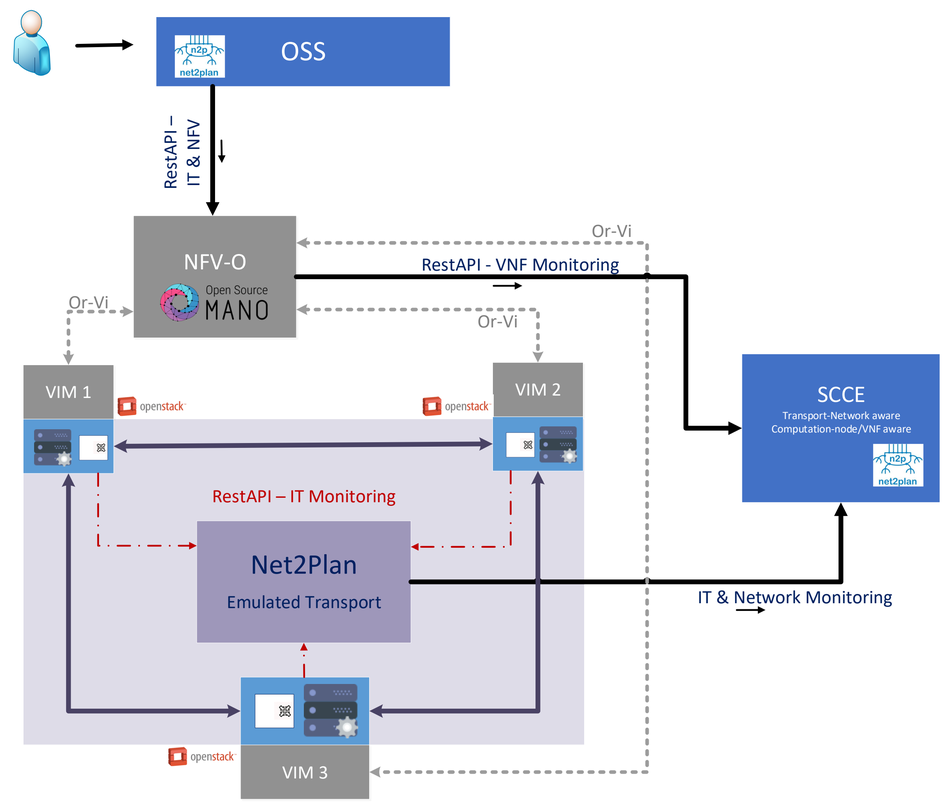
INTRODUCTION

Software-defined networking (SDN) and **network function virtualization (NFV)** are key technologies to address (i) because they enable dynamic management of **virtual network functions (VNFs)** across an advanced programmable network. Moreover, (ii) can be met instantiating VNFs in standard commodity hardware and exploiting hardware disaggregation and multi-vendor interoperability with SDN. Finally, a joint IT-network optimization is imperative to guarantee (iii) by fully exploiting the network resources and allocating service chains (SCs) of multiple VNFs efficiently.

OVERVIEW

This demonstration proofs the use of the specialized open-source planning tool Net2Plan to assist the NFV-Orchestrator (NFV-O) Open-Source MANO (OSM) in the optimal VNF instantiation, SC allocation and optimization of transport network.

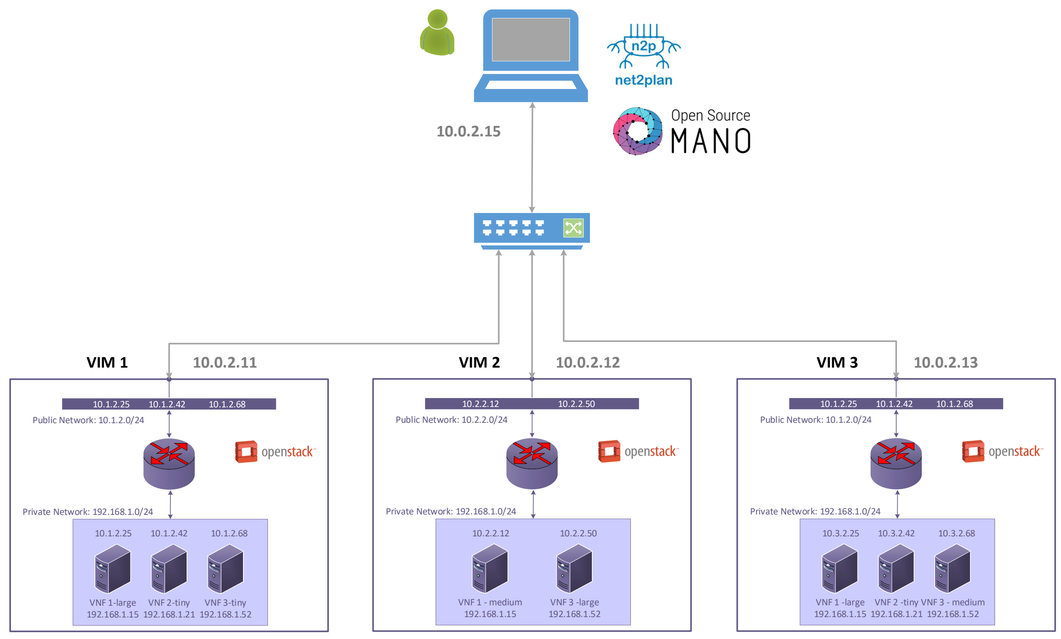
- **Operations Support System (OSS).** Represents an operator that deploys an application service. A GUI programmed in Net2Plan emulates operator's behavior.
- **NFV-O.** Is represented by OSM which is in charge of the virtualization infrastructure that manages and deploys VNFs leveraging in VIMs.
- **Emulated Transport**. Net2plan provides an emulated transport network where the VIMs are simulated to be placed on it.
- **SCCE**: a Service Chain Computation Element (SCCE) is an evolution of the Path Computation Element (PCE) tuned for service chain allocations, where the path is constrained to traverse a sequence of VNFs.

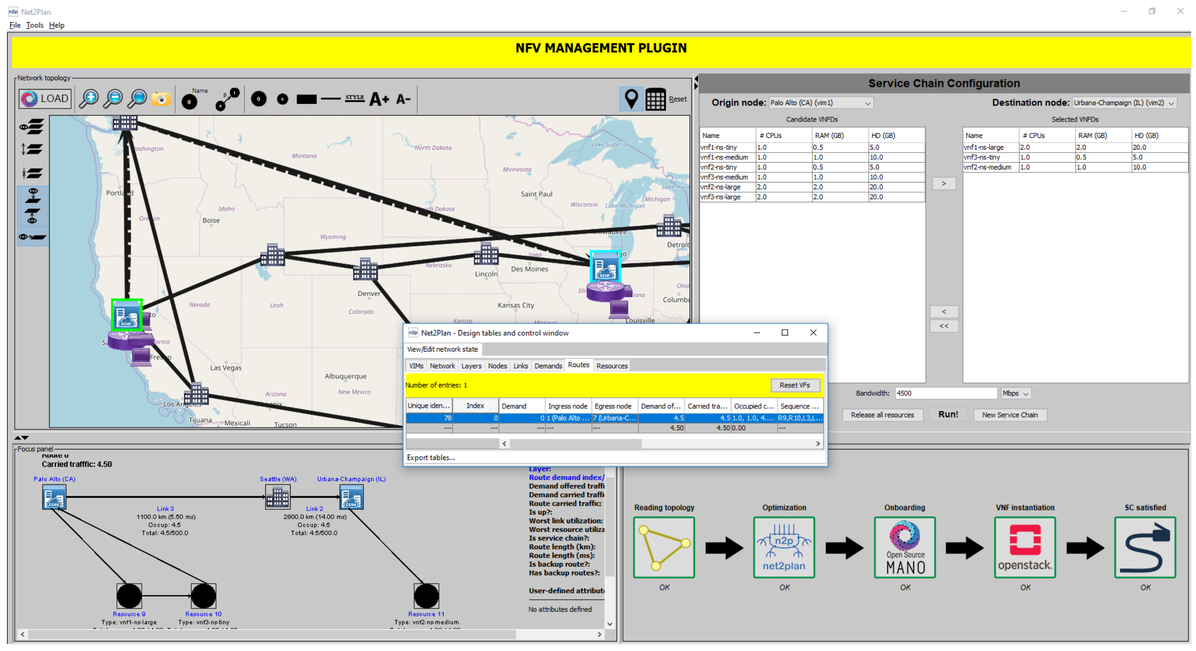


TESTBED CONFIGURATION

To test this proof of concept in NFV, a management network has been configured to interconnect **OSM** (installed in a personal laptop), three VIMs (**OpenStack**) and the planning tool **Net2plan** which allows a user interaction, emulates the transport network and provides an optimal-VNF-placement algorithm.

The VIMs (OpenStack) has been set up with an internal private network to place the VMs. A virtual router connects the private network with the public network to allow the automatic assignment of **floating IPs by OSM** to the VMs of the VNFs. In this way, an external connectivity to the VNFs is reached.





WORKFLOW

1. In the load process, **Net2plan** receives the entire information of the NVF and IT resources via **RestAPI** from **OSM** and the **VIMs.**
2. The **user** defines the **service chain** request (origin and destination nodes, sorted sequence of VNFs and bandwidth) from the **GUI**.
3. Net2plan receives the SC request and the **optimal algorithm** returns the path in the transport network and the placement of the VNFs.
4. **OSM** is noticed about the VNFs placement and **starts** the **instantiation** of the VNFs in the corresponding VIMs.
5. **Real connectivity** is provided between the origin and destination nodes through the sorted sequence of **VNFs**.

CONCLUSIONS

This demonstration offers a proof-of-concept in a dynamic NFV environment which proves that a fully interconnection between OSM, OpenStack and a planning tool in order to provide optimality is not only possible but also necessary within the incoming 5G era.

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