

S C r a M b L E

Management of ServiCes Across MultipLE clouds

WS18/19-SS19

Computer Networks Group

Prof. Dr. Holger Karl

Hadi Razzaghi Kouchaksaraei, Sevil Dräxler



PADERBORN UNIVERSITY
The University for the Information Society

SFB 901
ON - THE - FLY COMPUTING

5G-PICTURE

Overview

- **What is NFV?**
- WP1: Service descriptor translator
- WP2: Service descriptor splitter
- WP3: MANO scalability support
- Cross-WPs tasks

Network Function Virtualization (NFV)



Users

Hamburg



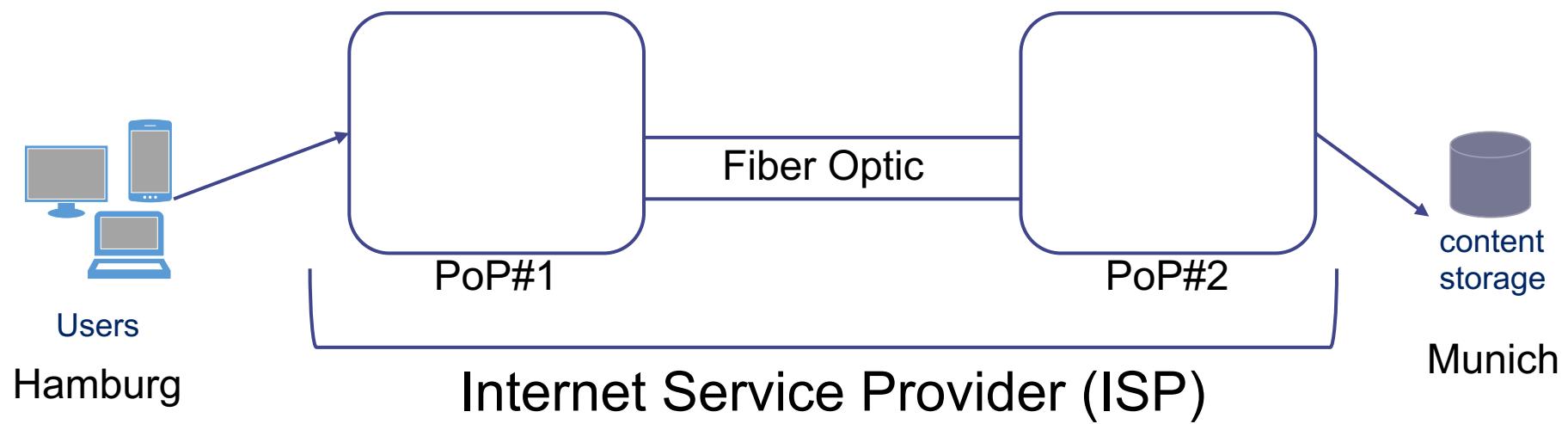
content
storage

Munich

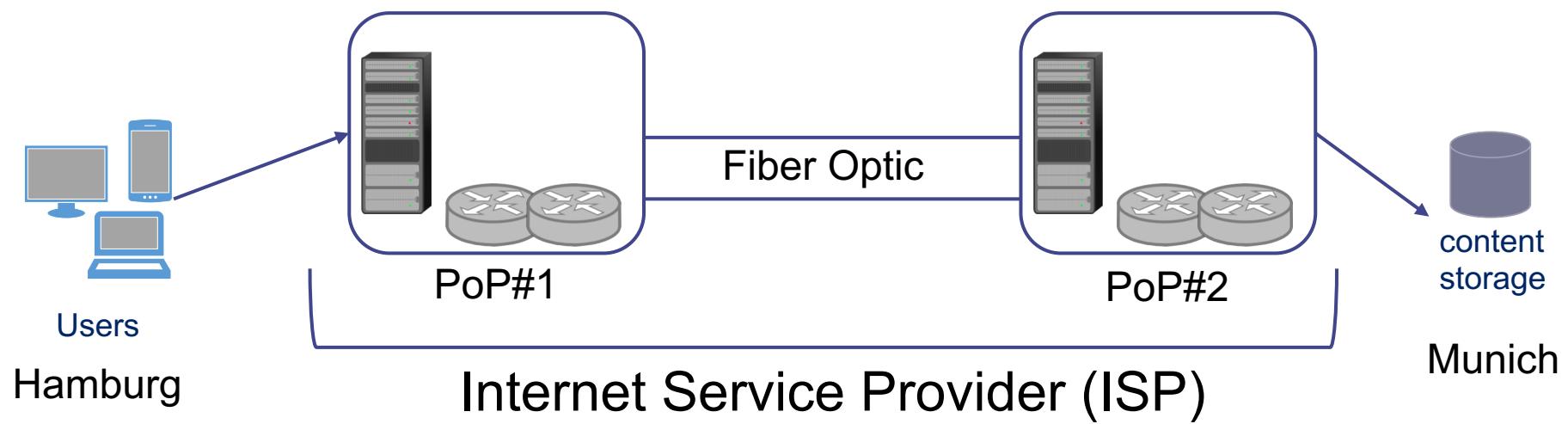
Network Function Virtualization (NFV)



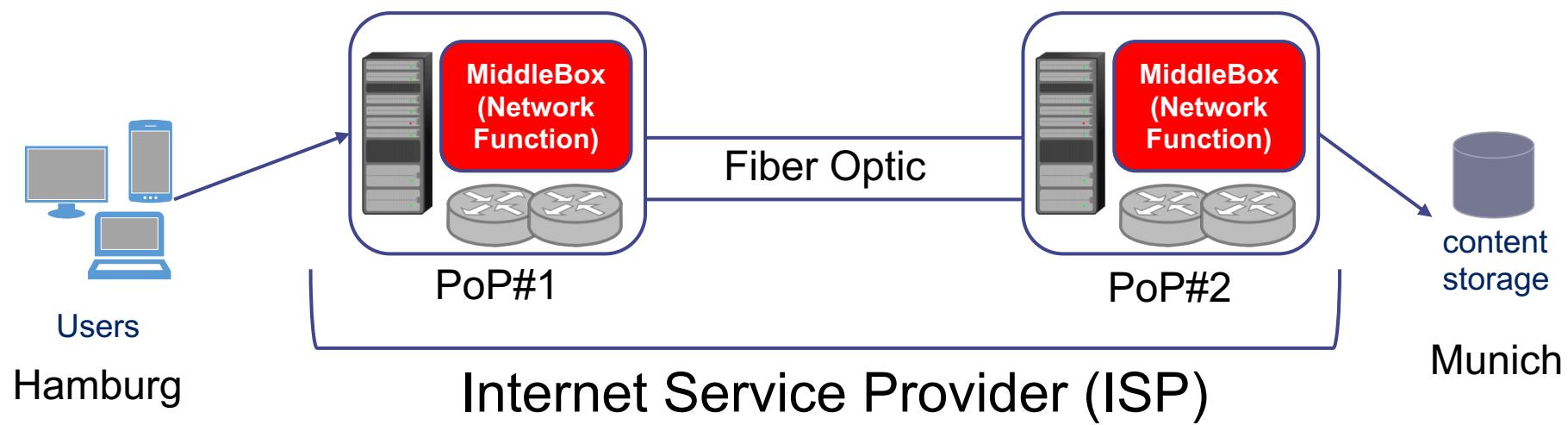
Network Function Virtualization (NFV)



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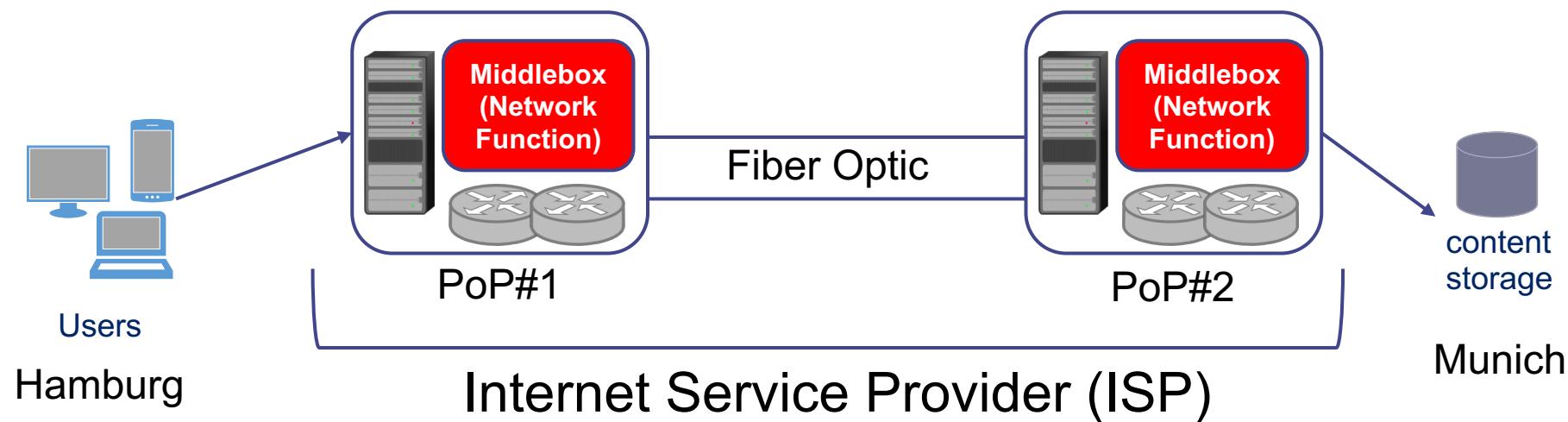


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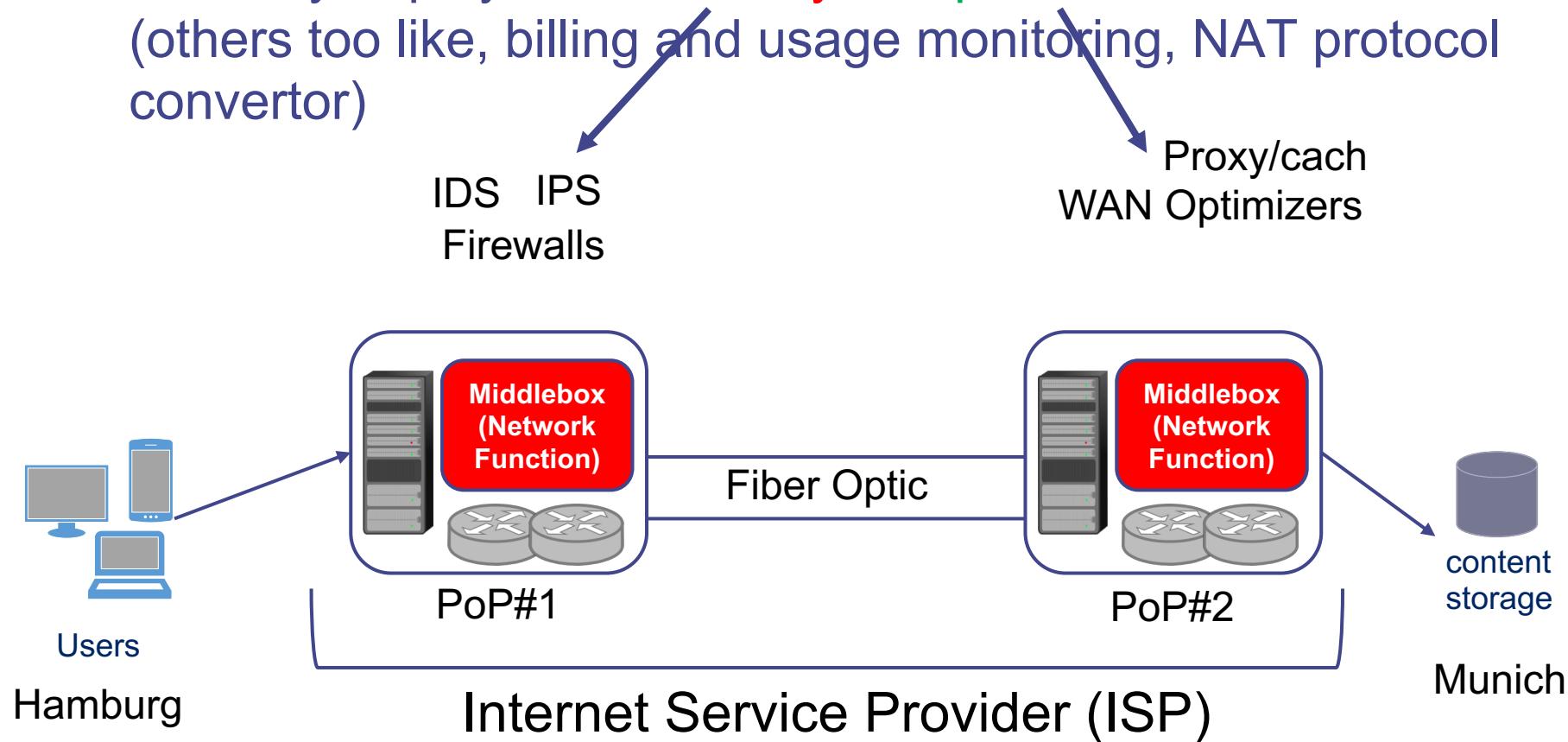
Network Function Virtualization (NFV)

- Middlebox: any intermediary device performing functions on datagram path between a source host and destination host
- Primarily deployed for **security** and **performance** benefit (others too like, billing and usage monitoring, NAT protocol convertor)



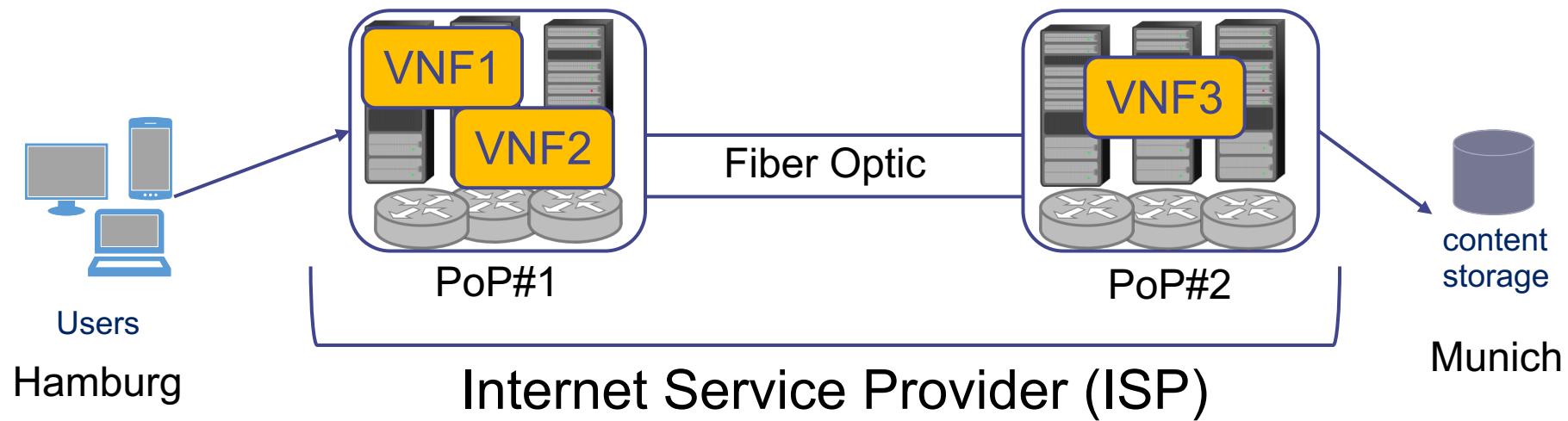
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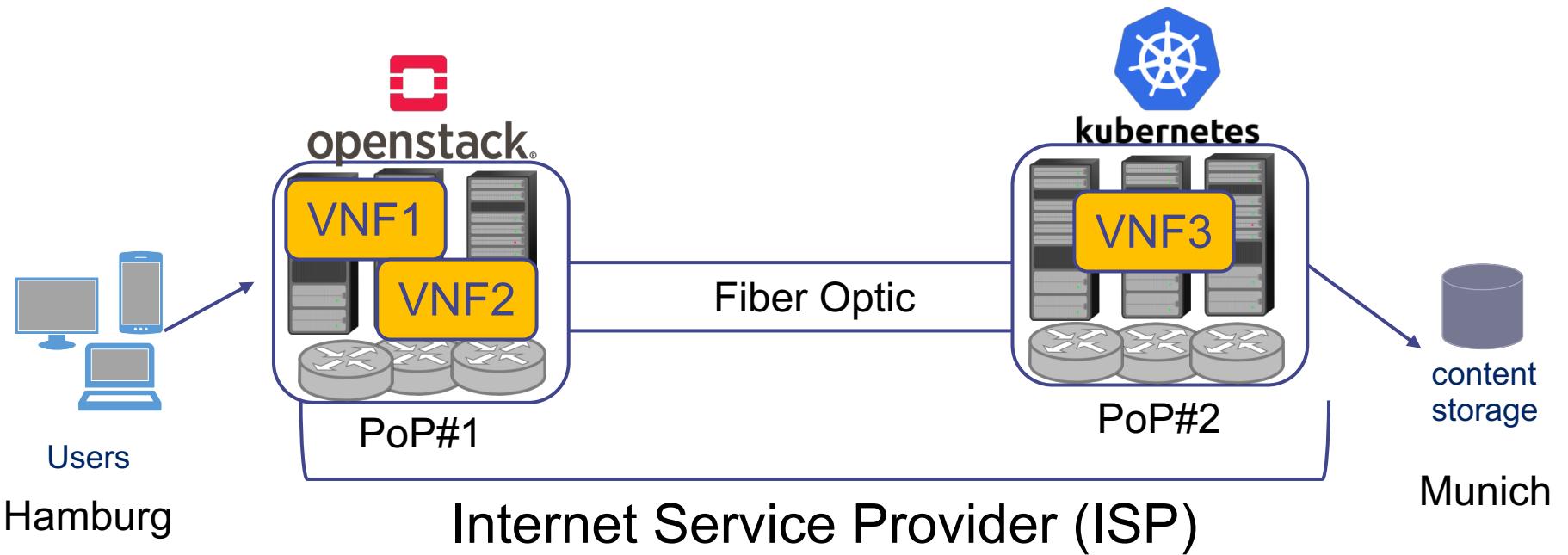


Network Function Virtualization (NFV)

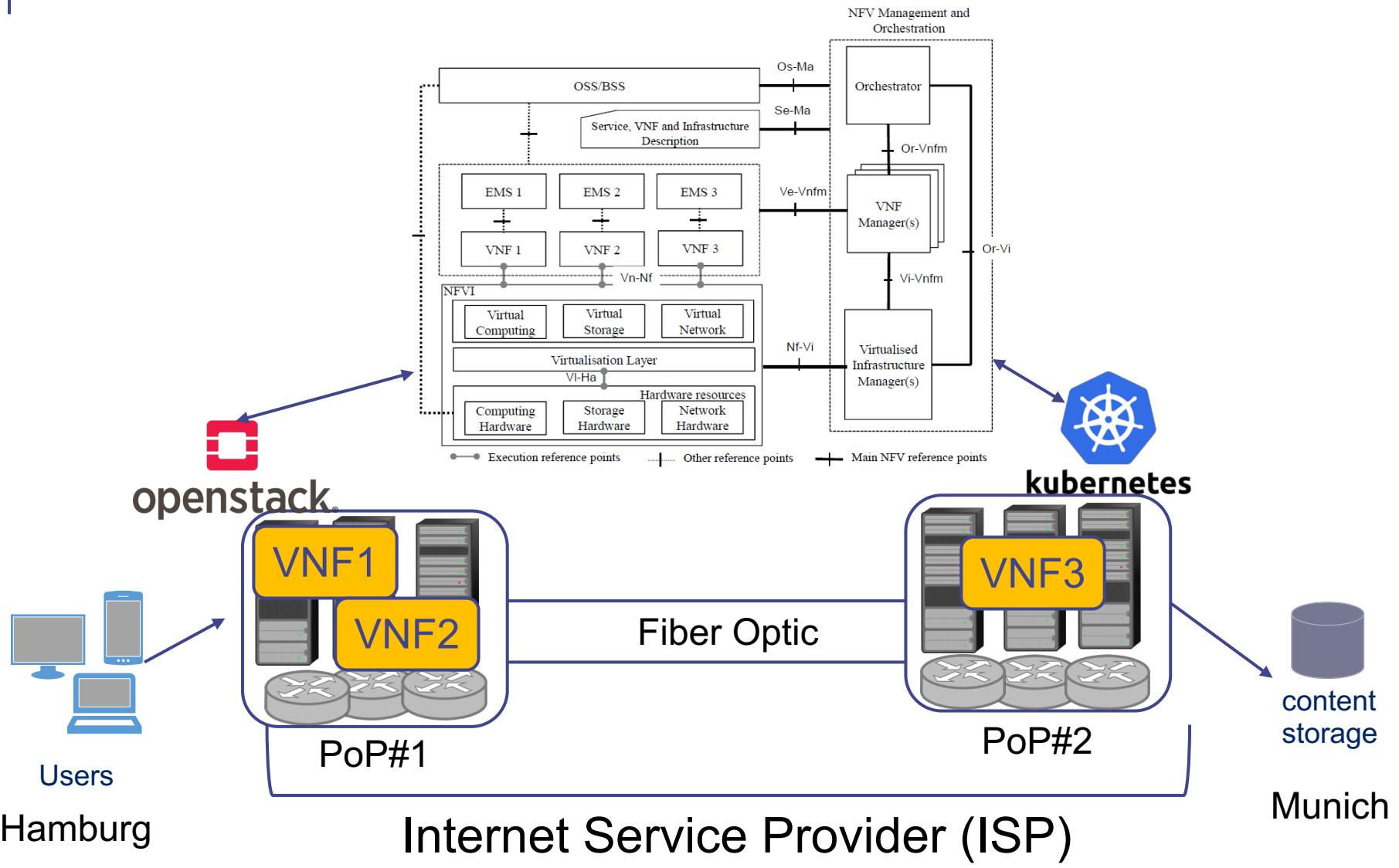
- NFV decouples network functions from dedicated hardware devices
- Allow them to be hosted on virtual machines (VMs)



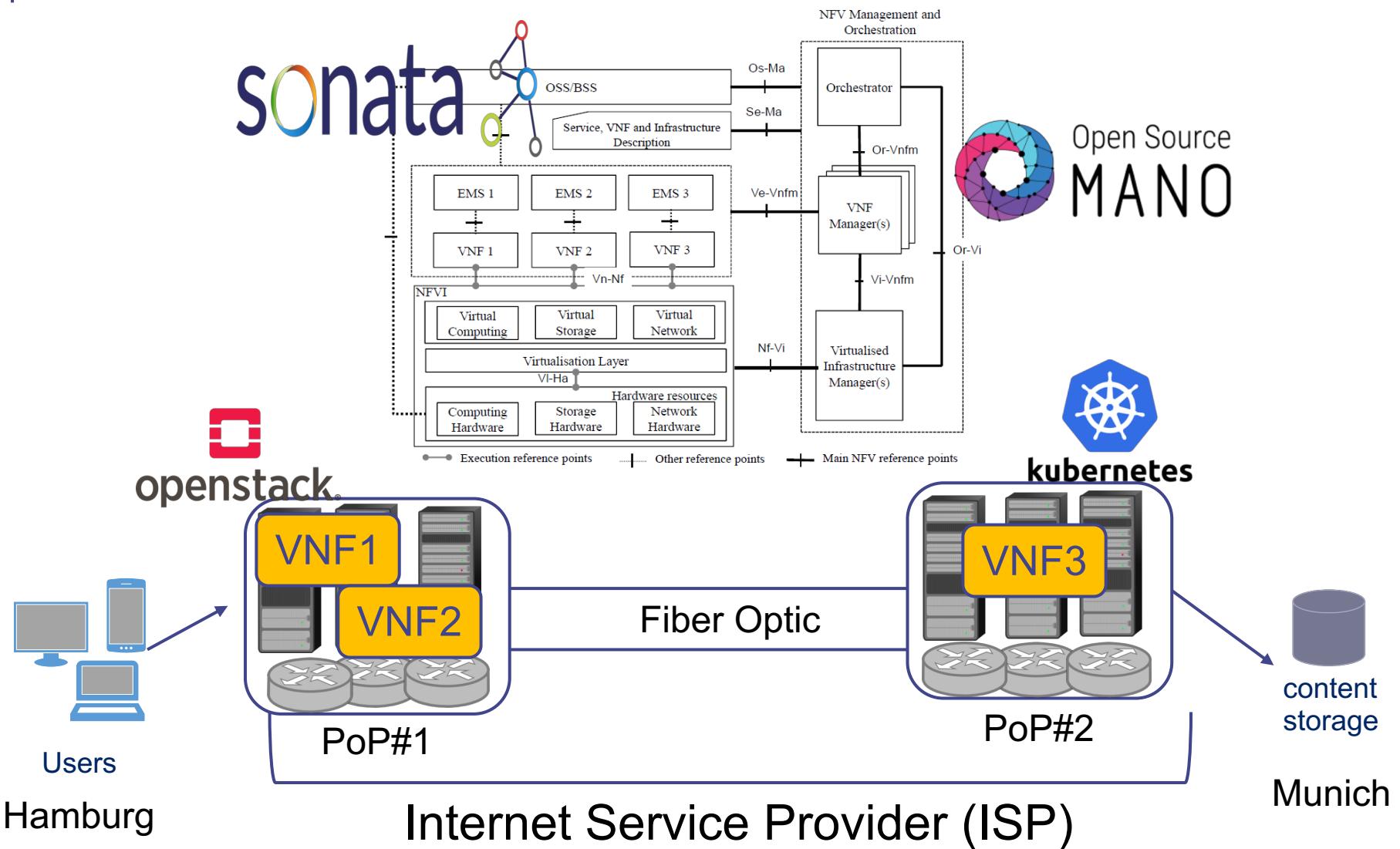
Management and orchestration (MANO) framework



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Management and orchestration (MANO) framework



Overview

- What is NFV?
- **WP1: Service descriptor translator**
- WP2: Service descriptor splitter
- WP3: MANO scalability support
- Cross-WPs tasks

WP1: Service descriptor translator (SDT)

- Network service descriptor (NSD)
 - Template that describes the deployment of a Network Service
 - Consists of constituent VNFs, virtual links, and VNF forwarding graphs
- Virtual network function descriptor (VNFD)
 - Used in the process of VNF on-boarding and managing the lifecycle of a VNF instance
 - Configuration template that describes a VNF in terms of its deployment and operational behaviour (e.g., resource requirements, scaling behaviour)

WP1: Service descriptor translator (SDT)

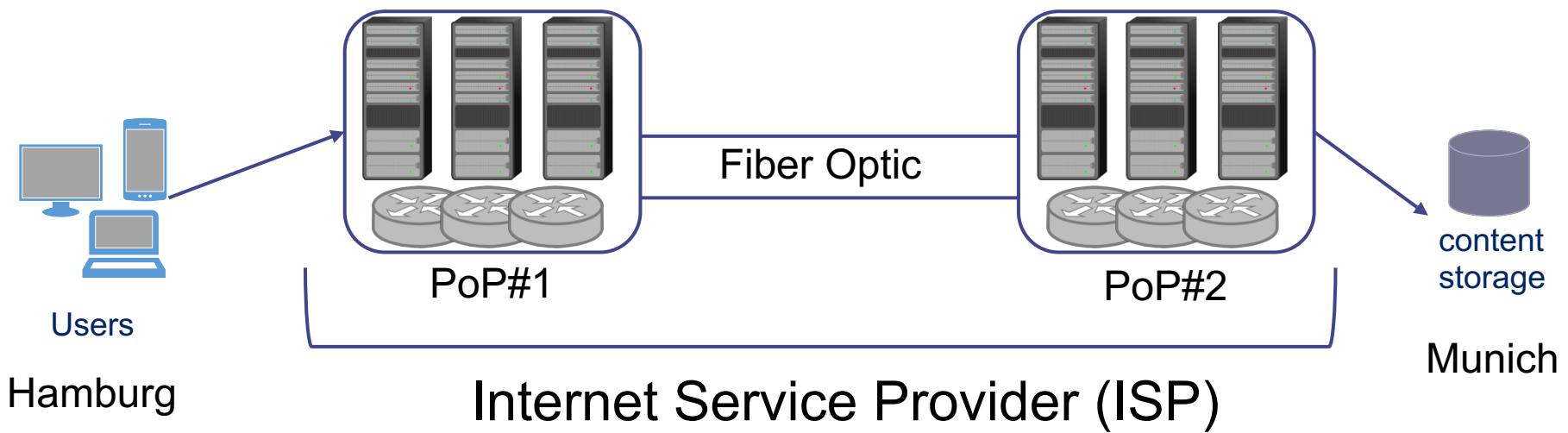
```
nsd:nsd-catalog:  
  nsd:  
    - id: 3vdu_2vnf_lvnffg_nsd  
      name: 3vdu_2vnf_lvnffg_ns-name  
      short-name: 3vdu_2vnf_lvnffg-sname  
      description: 3 vnfs, each one with 2 cirros vdu,  
      vendor: OSM  
      version: '1.0'  
  
      logo: osm_2x.png  
  
      constituent-vnfd:  
        # The member-vnf-index needs to be unique, st  
        # vnfd-id-ref is the id of the VNFD  
        # Multiple constituent VNFs can be specified  
        - member-vnf-index: 1  
          vnfd-id-ref: 2vdu_vnfd  
        - member-vnf-index: 2  
          vnfd-id-ref: 2vdu_vnfd  
        - member-vnf-index: 3  
          vnfd-id-ref: 2vdu_vnfd  
  
      ip-profiles:  
        - description: Inter VNF Link  
          ip-profile-params:  
            gateway-address: 31.31.31.210  
            ip-version: ipv4  
            subnet-address: 31.31.31.0/24  
            dns-server:  
              - address: 8.8.8.8  
              - address: 8.8.8.9  
            dhcp-params:  
              count: 200  
              start-address: 31.31.31.2  
          name: ipprofileA  
  
      vld:  
        # Networks for the VNFs  
        - id: vld1  
          name: vld1-name  
          short-name: vld1-sname
```

OSM NSD

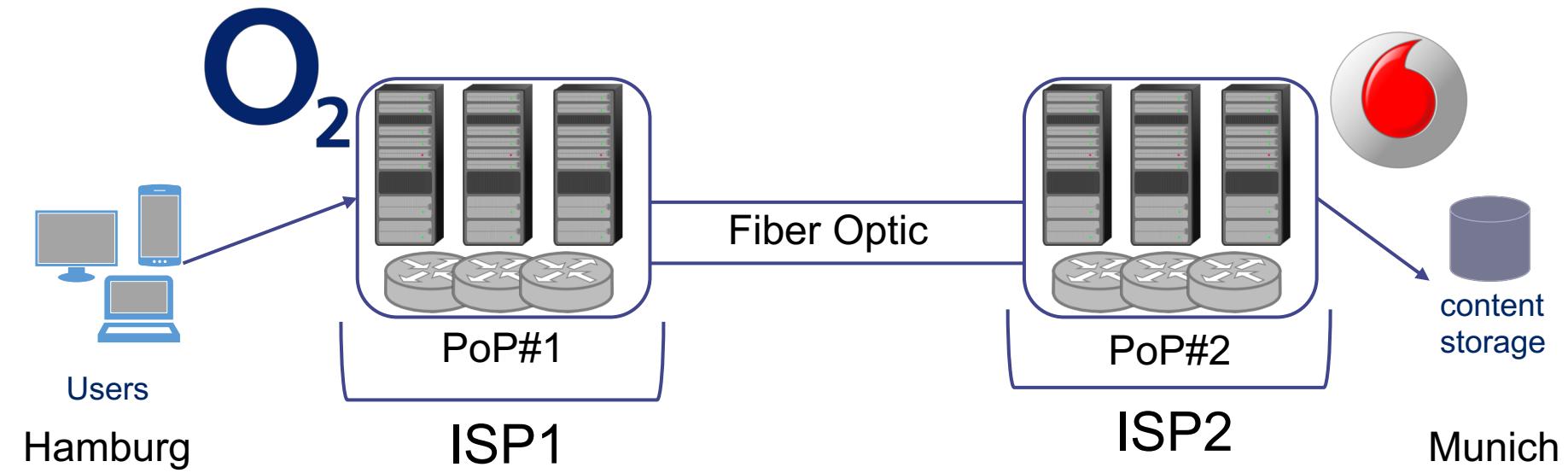
```
---  
  descriptor_version: "1.0"  
  
  vendor: "eu.sonata-nfv"  
  name: "sonata-fw-dpi-service"  
  version: "0.1"  
  author: "Manuel Peuster, Paderborn University, manuel.p.  
  description: "Example firewall+ dpi (Snort+Ryu+OvS) se  
  
  ##  
  ## The various network functions this service  
  ## is composed of.  
  
  ##  
  network_functions:  
    - vnf_id: "snort"  
      vnf_vendor: "eu.sonata-nfv"  
      vnf_name: "snort-vnf"  
      vnf_version: "0.1"  
    - vnf_id: "ovs1"  
      vnf_vendor: "eu.sonata-nfv"  
      vnf_name: "ovs1-vnf"  
      vnf_version: "0.1"  
    - vnf_id: "ctrl"  
      vnf_vendor: "eu.sonata-nfv"  
      vnf_name: "ctrl-vnf"  
      vnf_version: "0.1"  
  
    ##  
    ## The NS connection points to the  
    ## outside world.
```

SONATA NSD

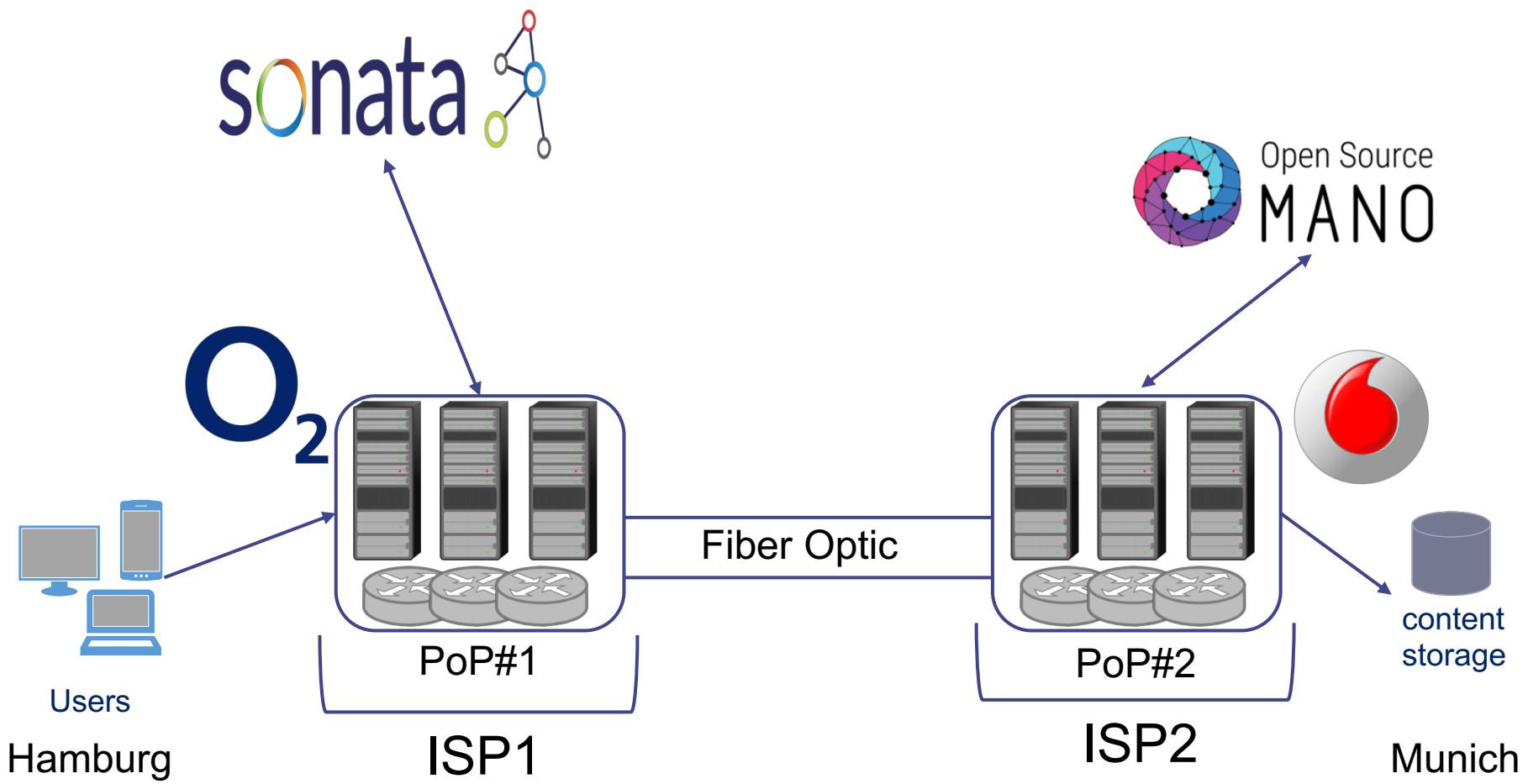
WP1: Service descriptor translator (SDT)



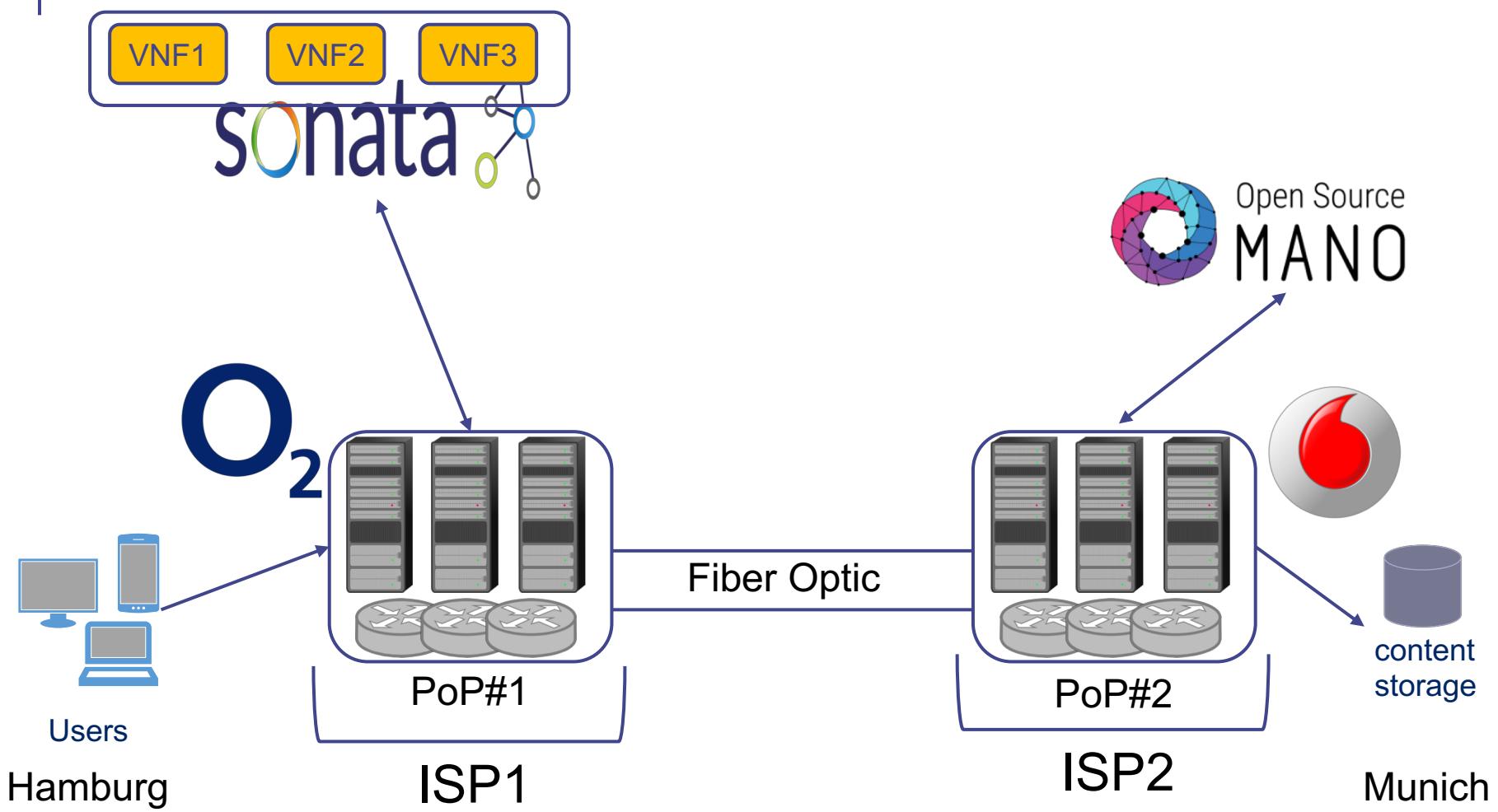
WP1: Service descriptor translator (SDT)



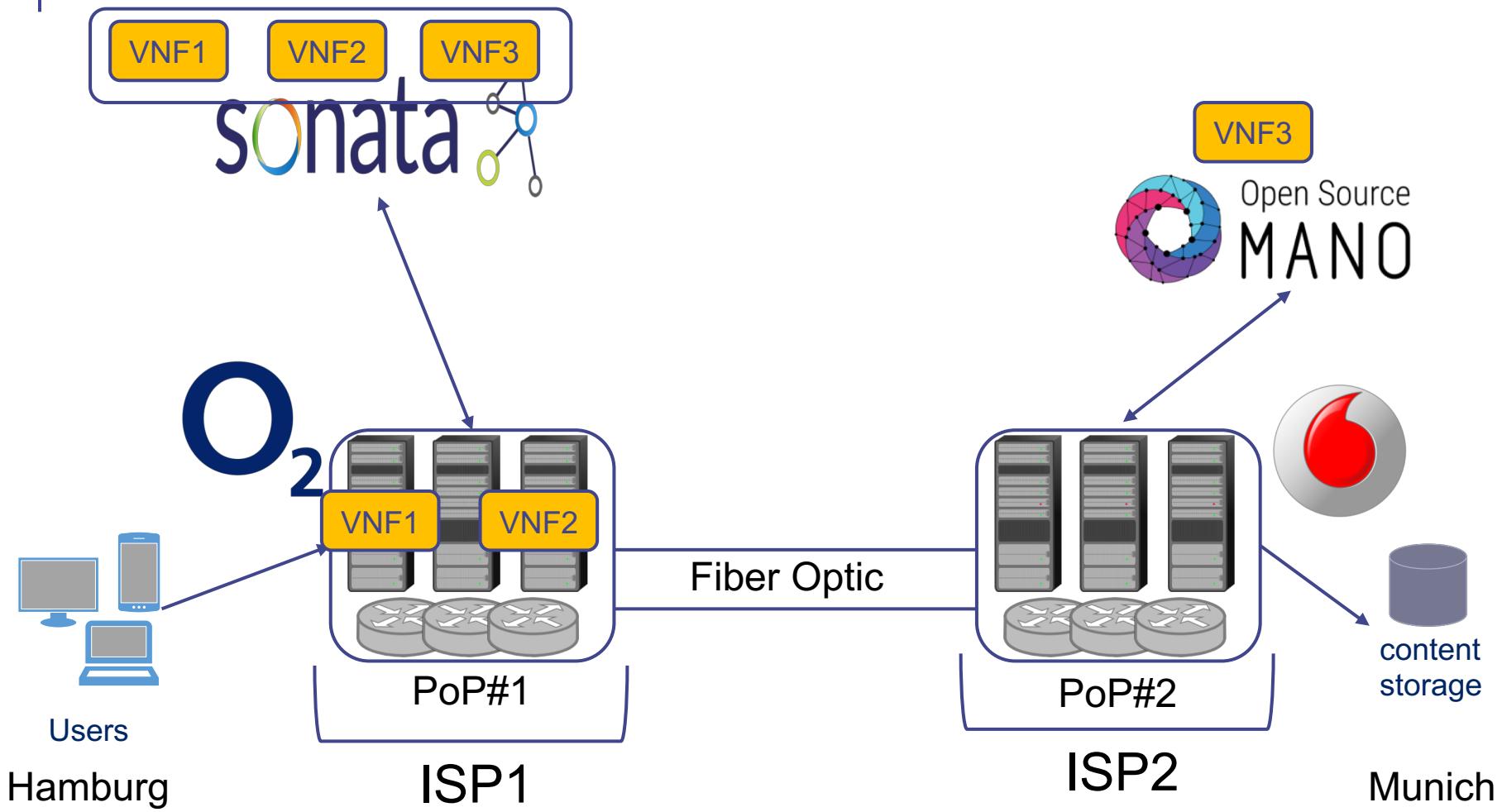
WP1: Service descriptor translator (SDT)



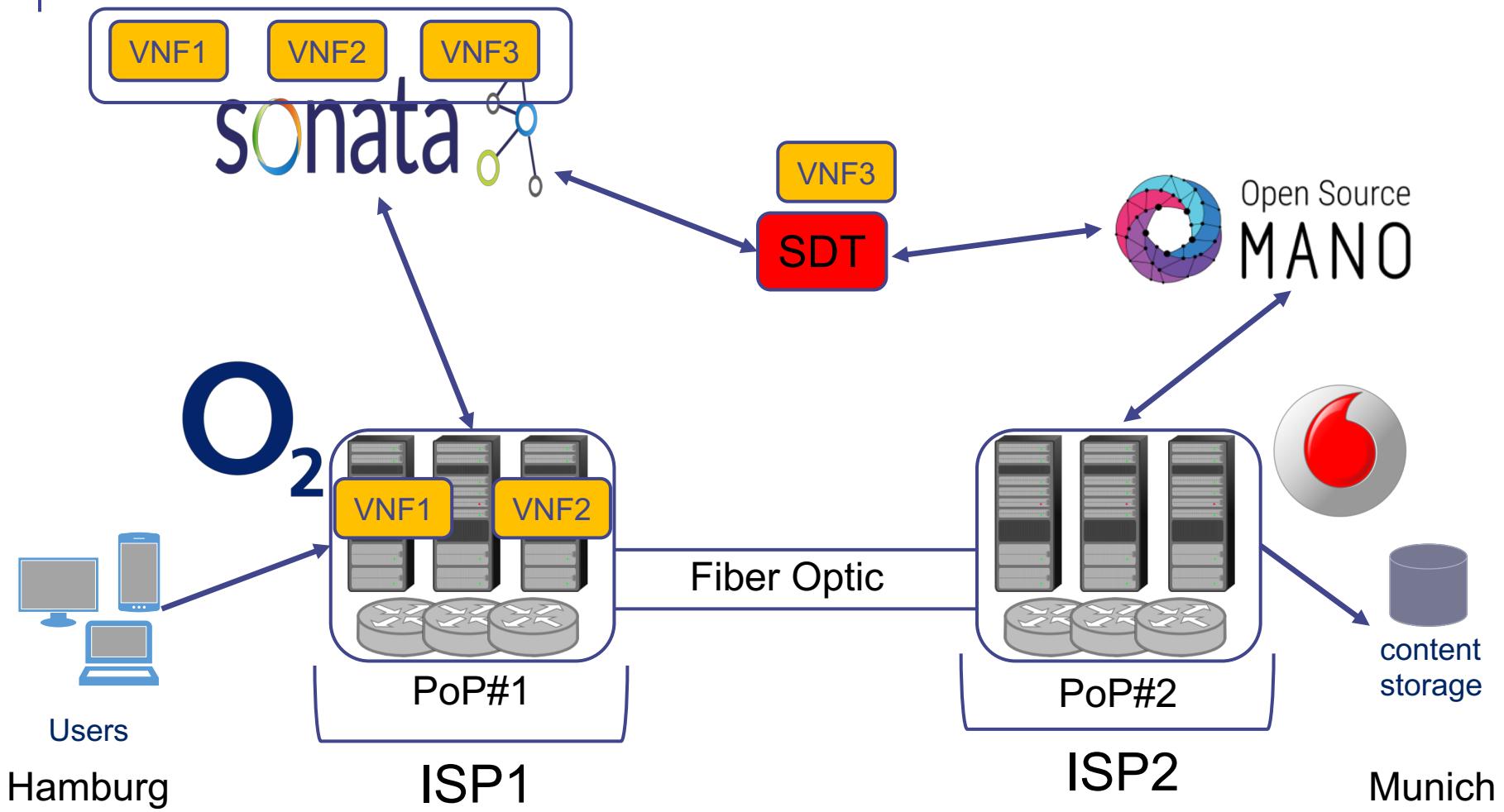
WP1: Service descriptor translator (SDT)



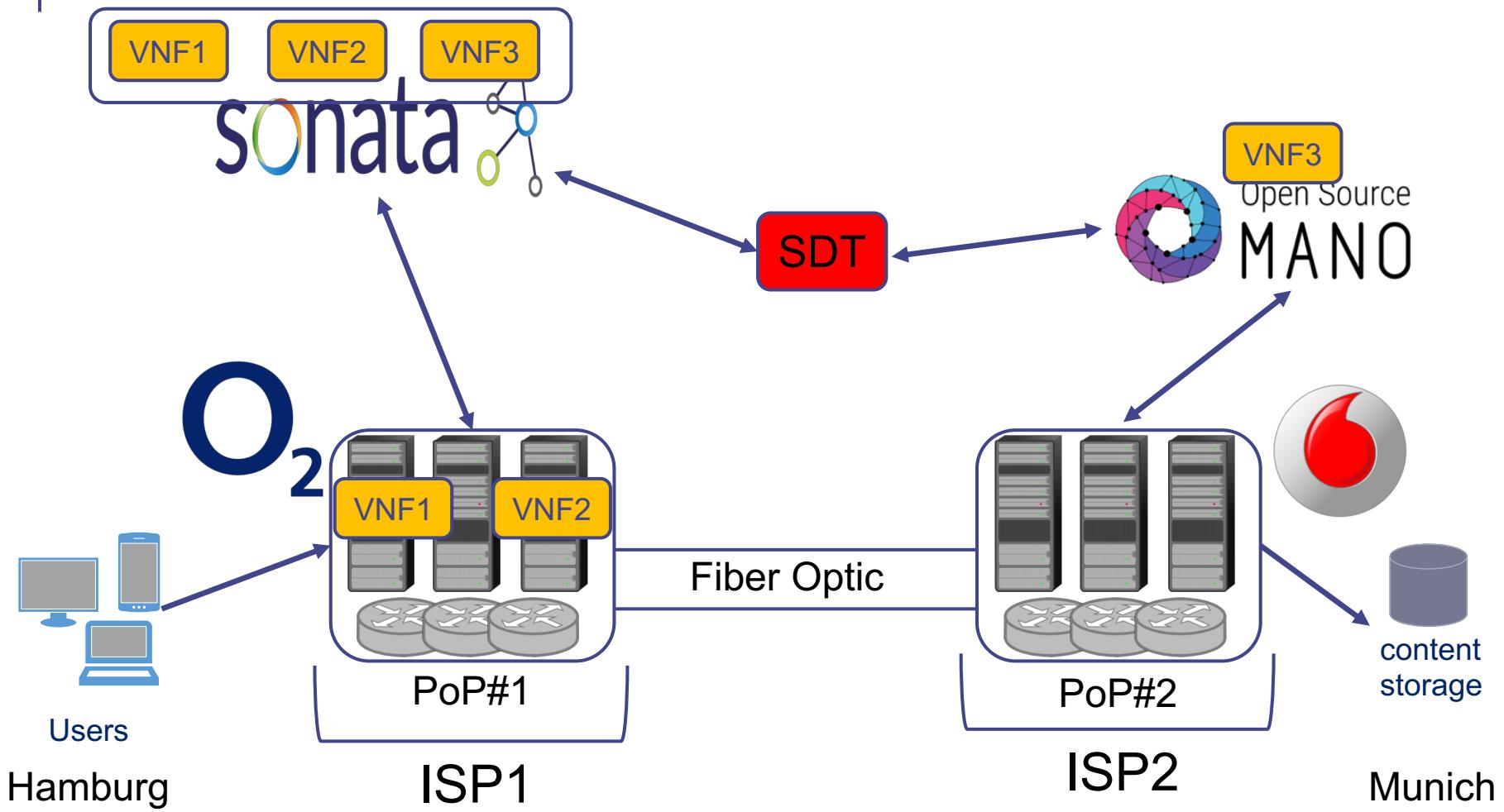
WP1: Service descriptor translator (SDT)



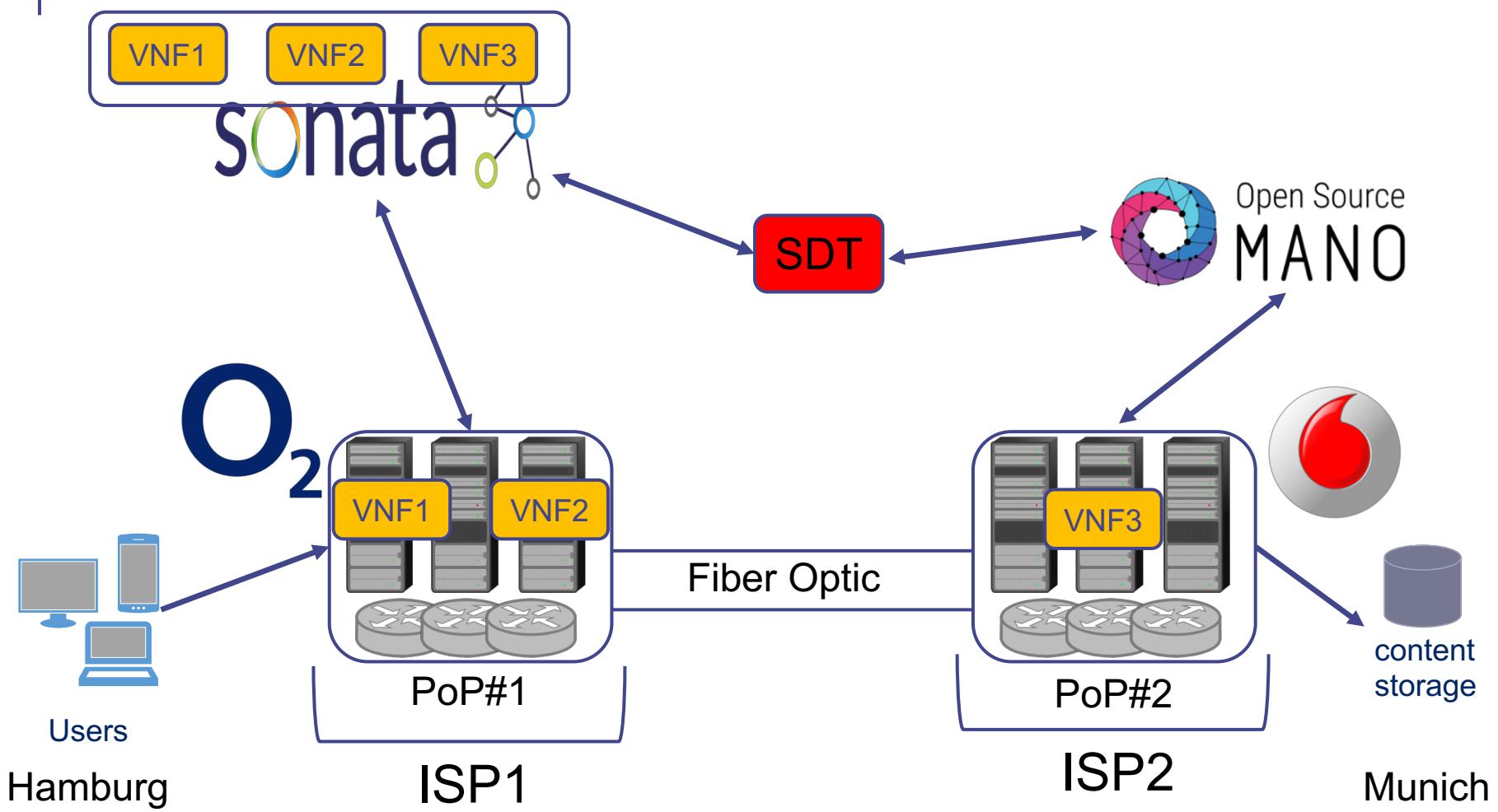
WP1: Service descriptor translator (SDT)



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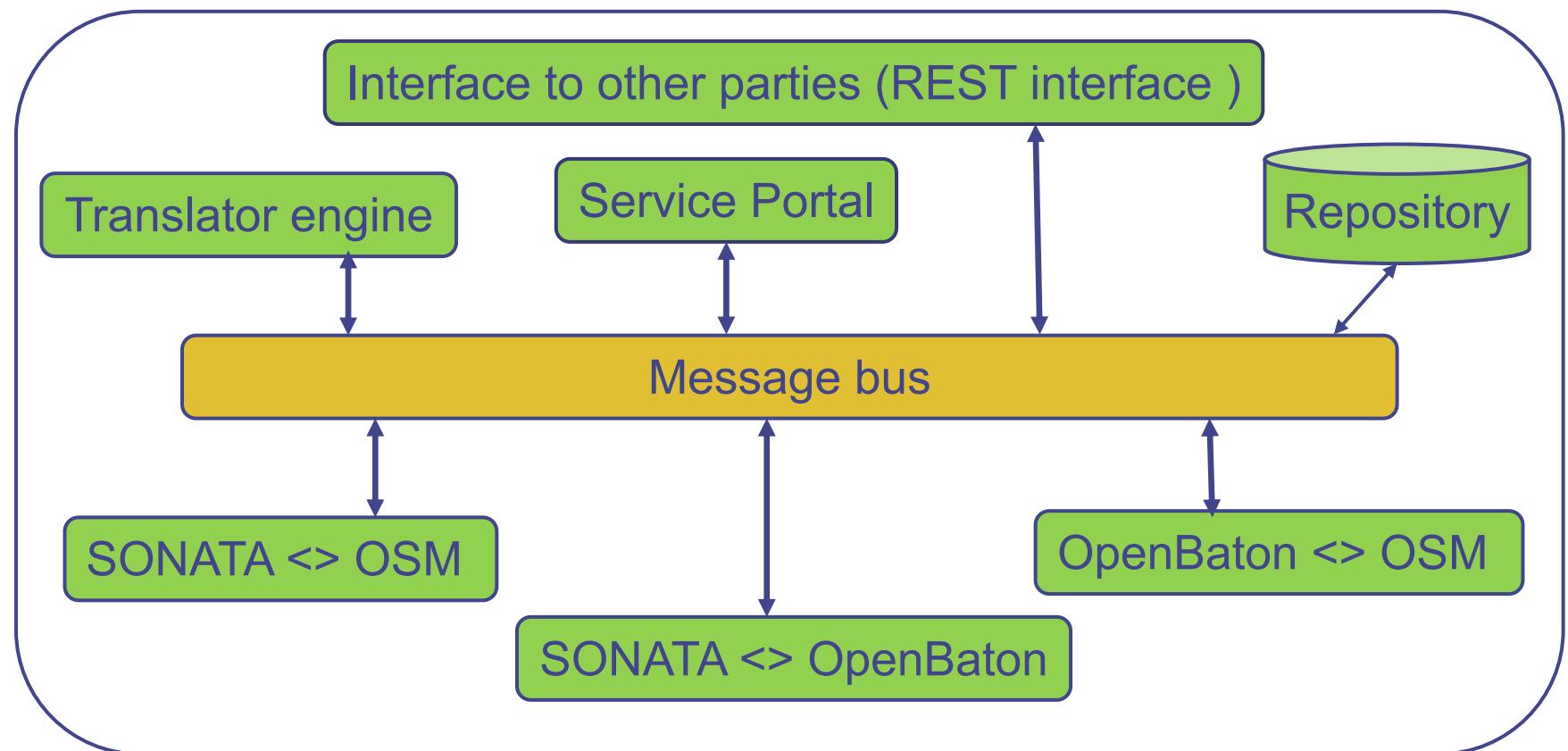


WP1 tasks

- T1.1: Requirements definitions and architecture design
- T1.2: Prototype implementation of SDT components
- T1.3: Proof of concept demonstration

T1.1

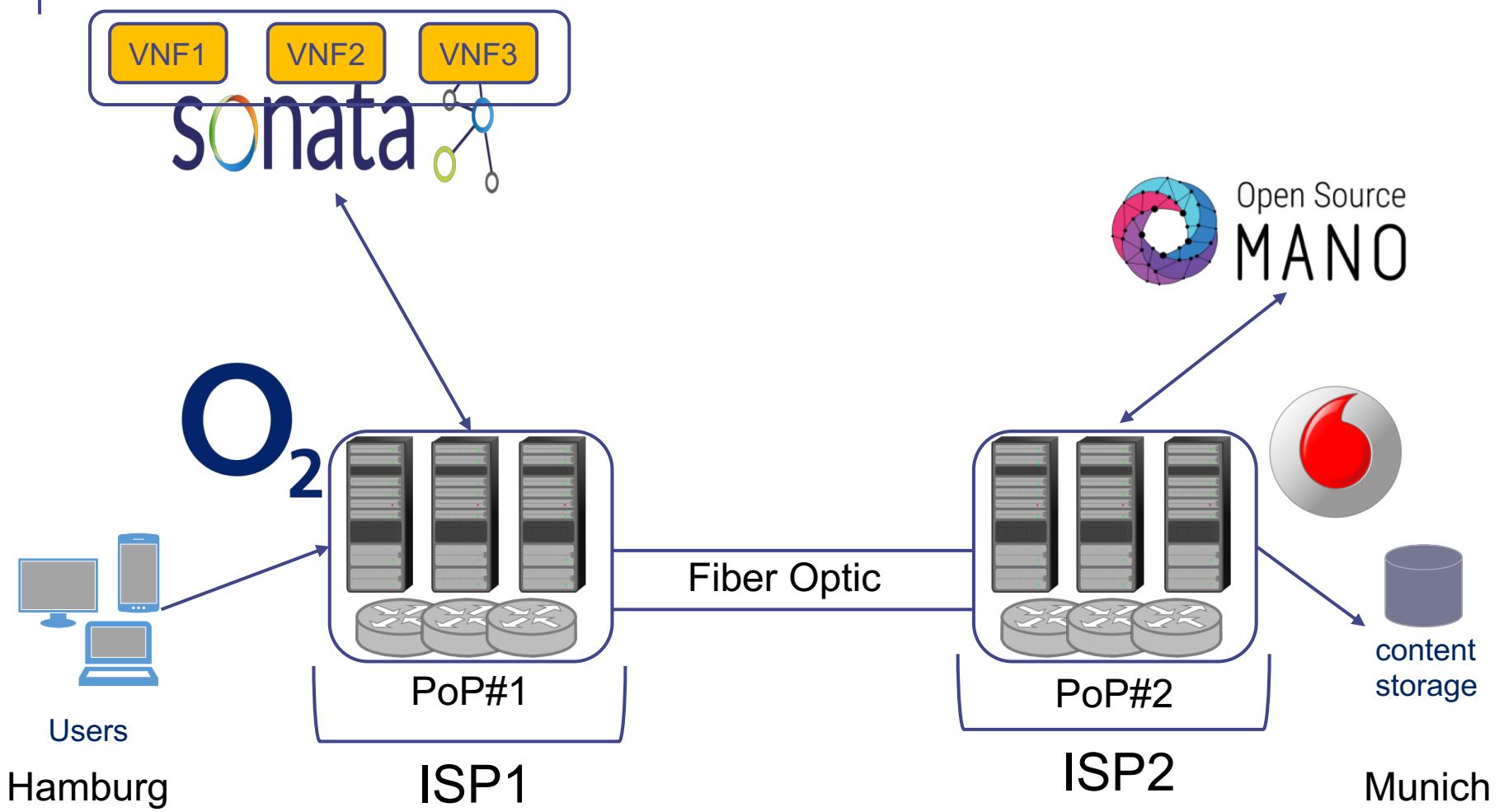
- Requirements definitions and architecture design
- Possible SDT architecture



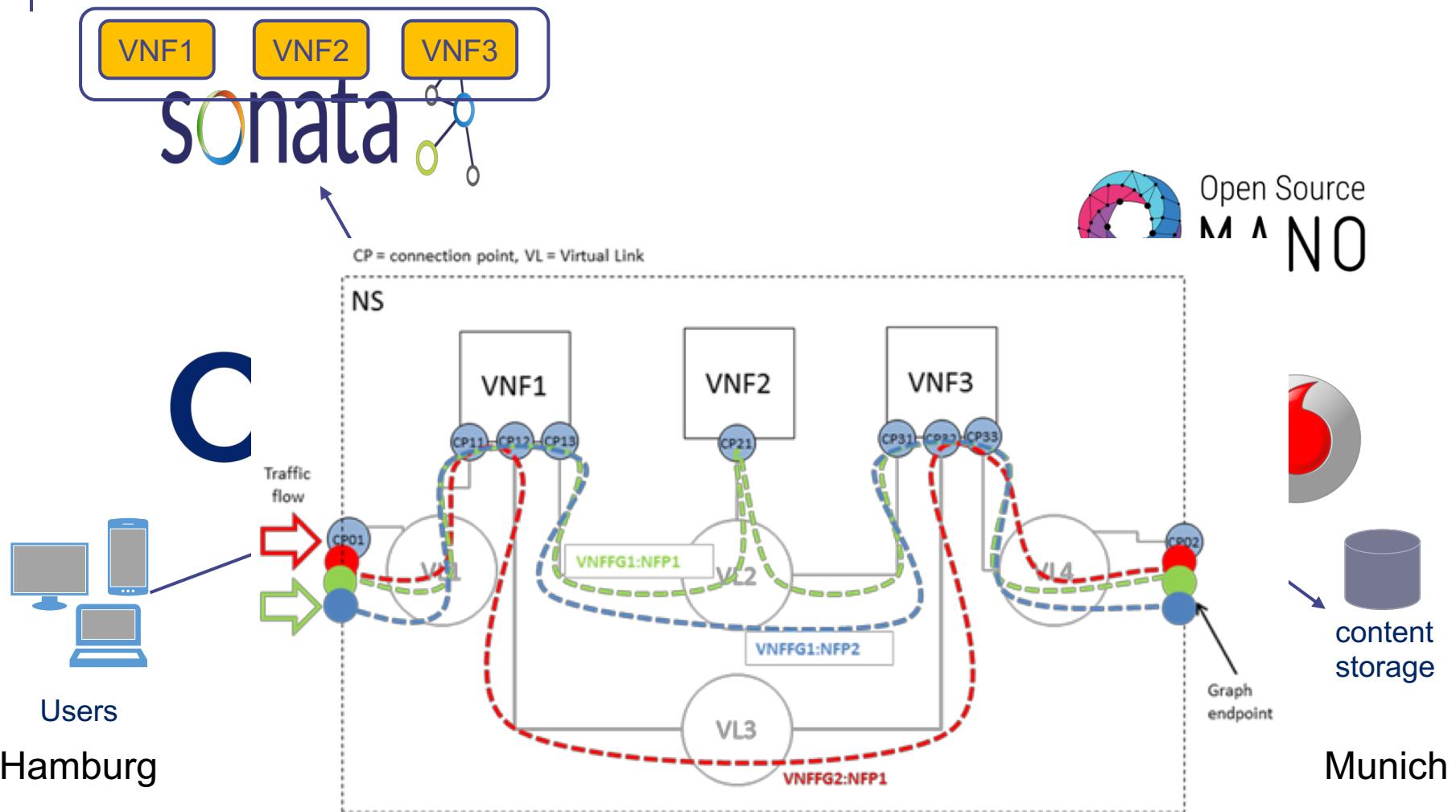
Overview

- What is NFV?
- WP1: Service descriptor translator
- **WP2: Service descriptor splitter**
- WP3: MANO scalability support
- Cross-WPs tasks

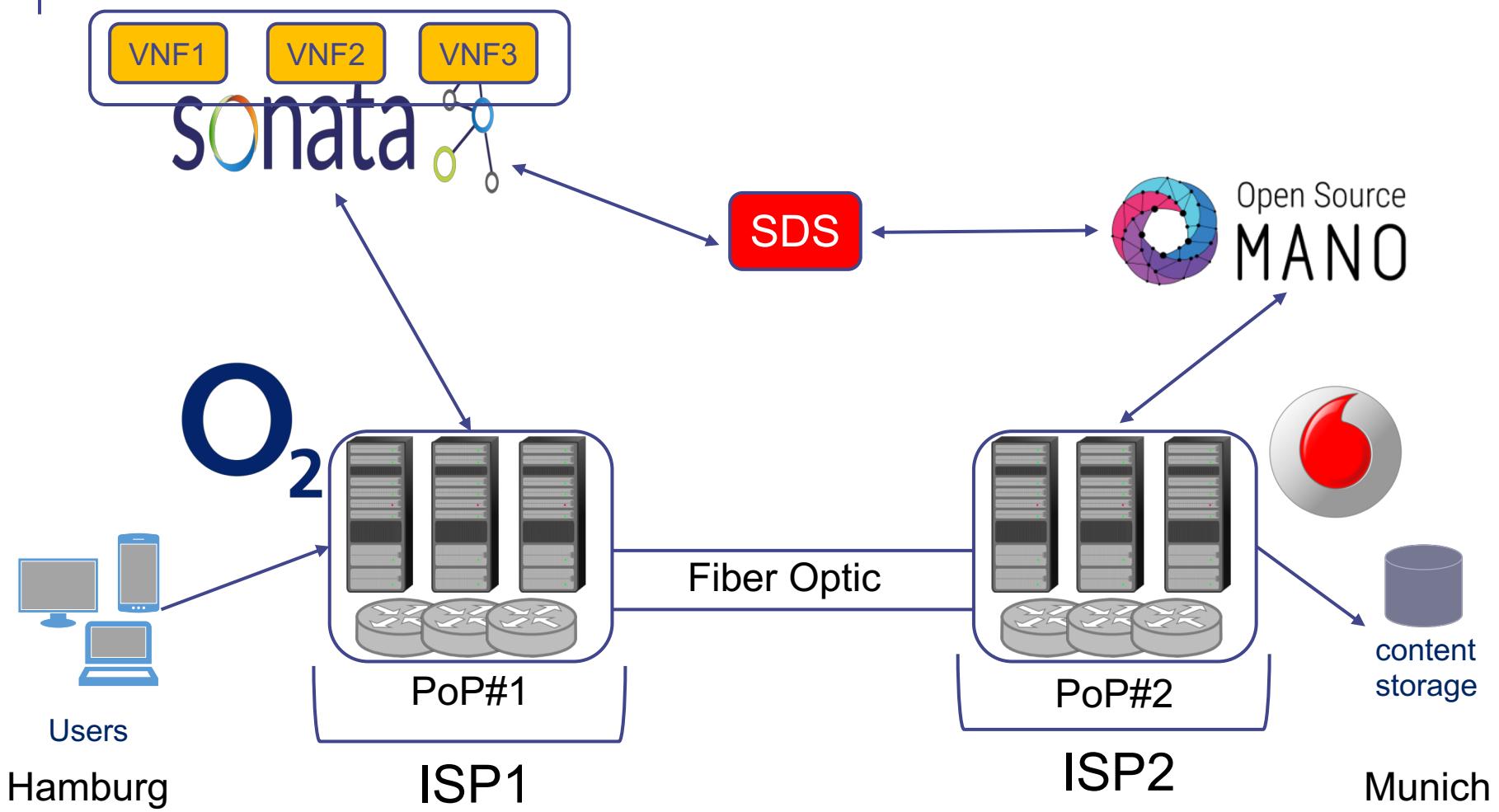
WP2: Service descriptor splitter (SDS)



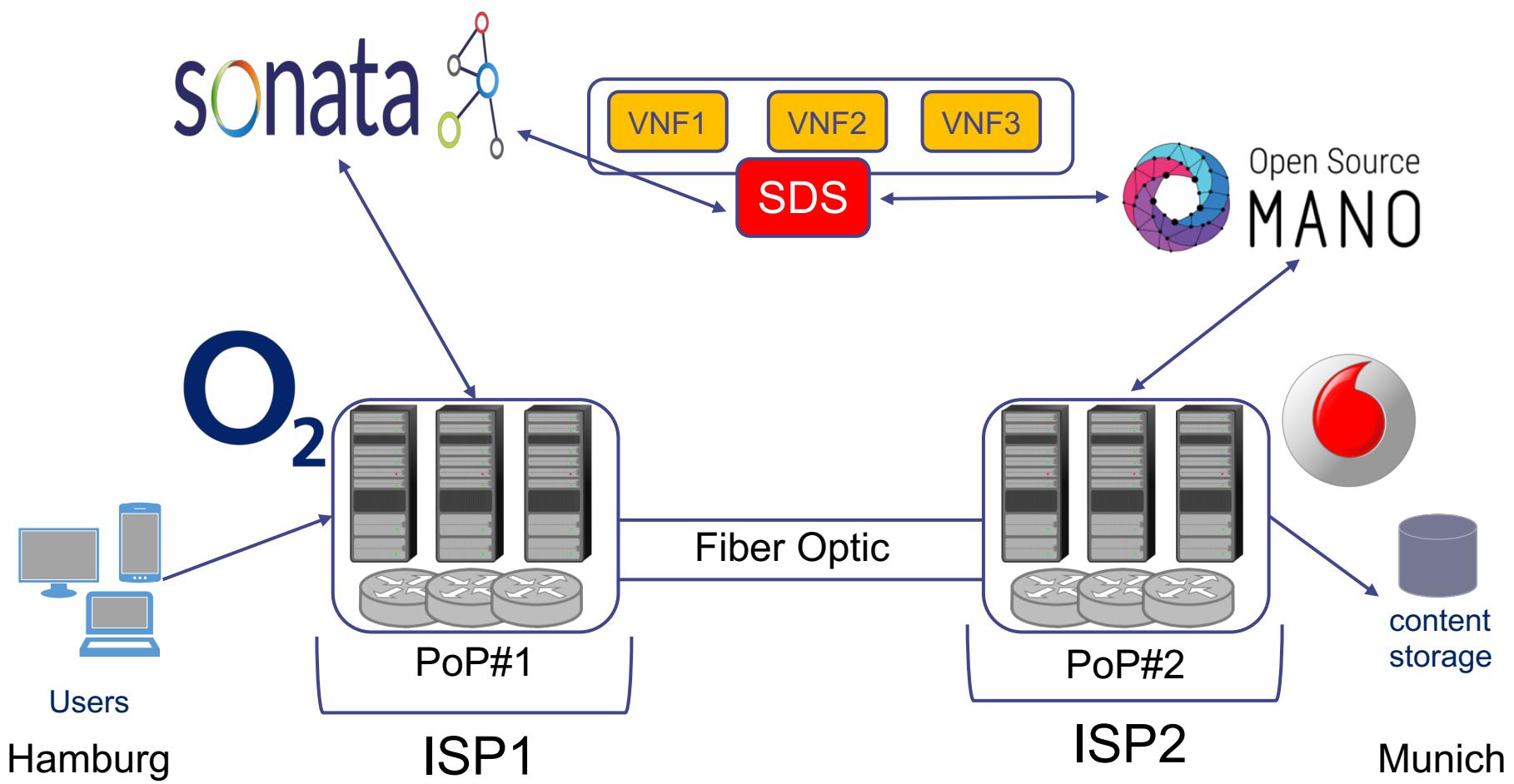
WP2: Service descriptor splitter (SDS)



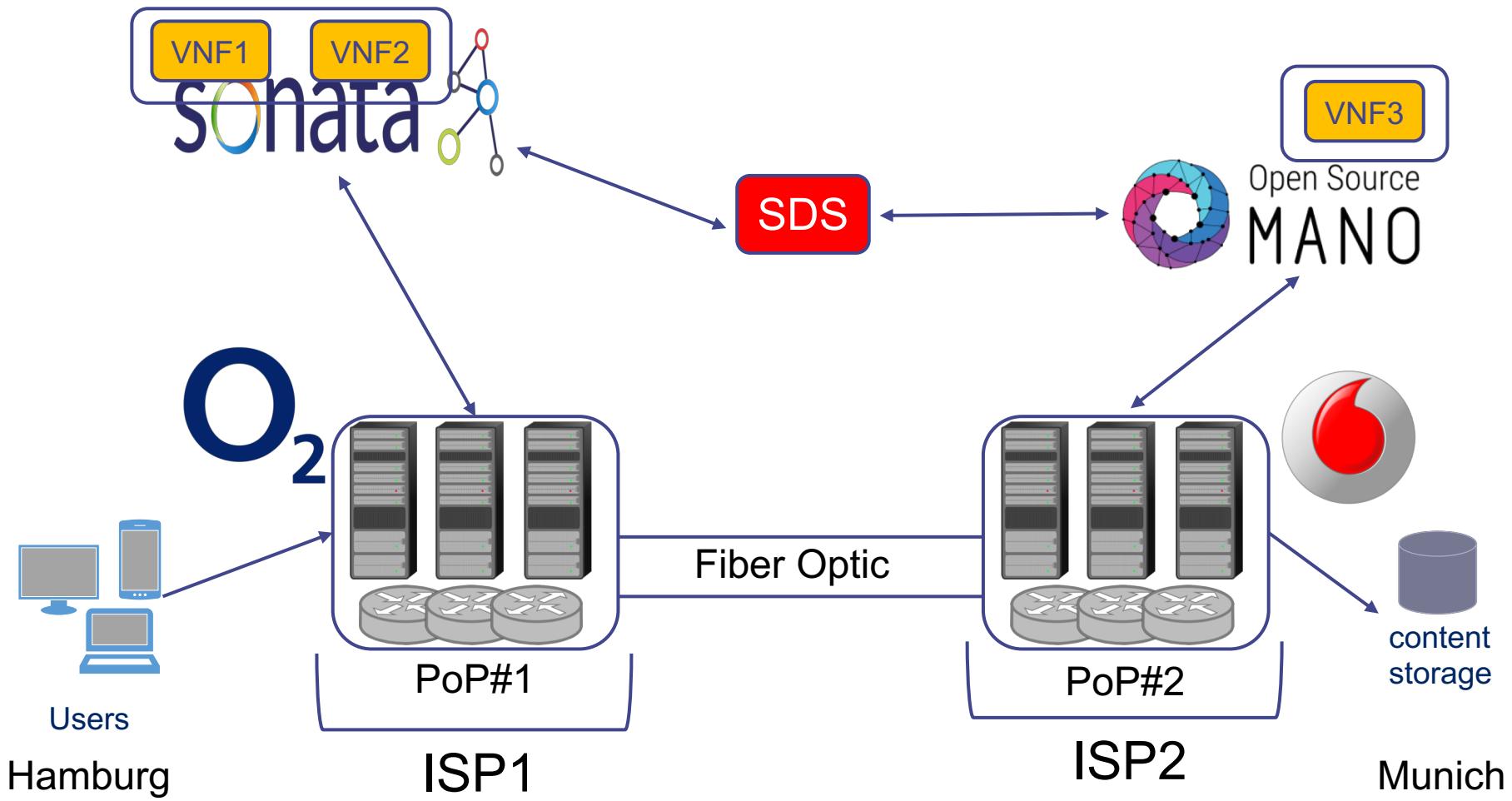
WP2: Service descriptor splitter (SDS)



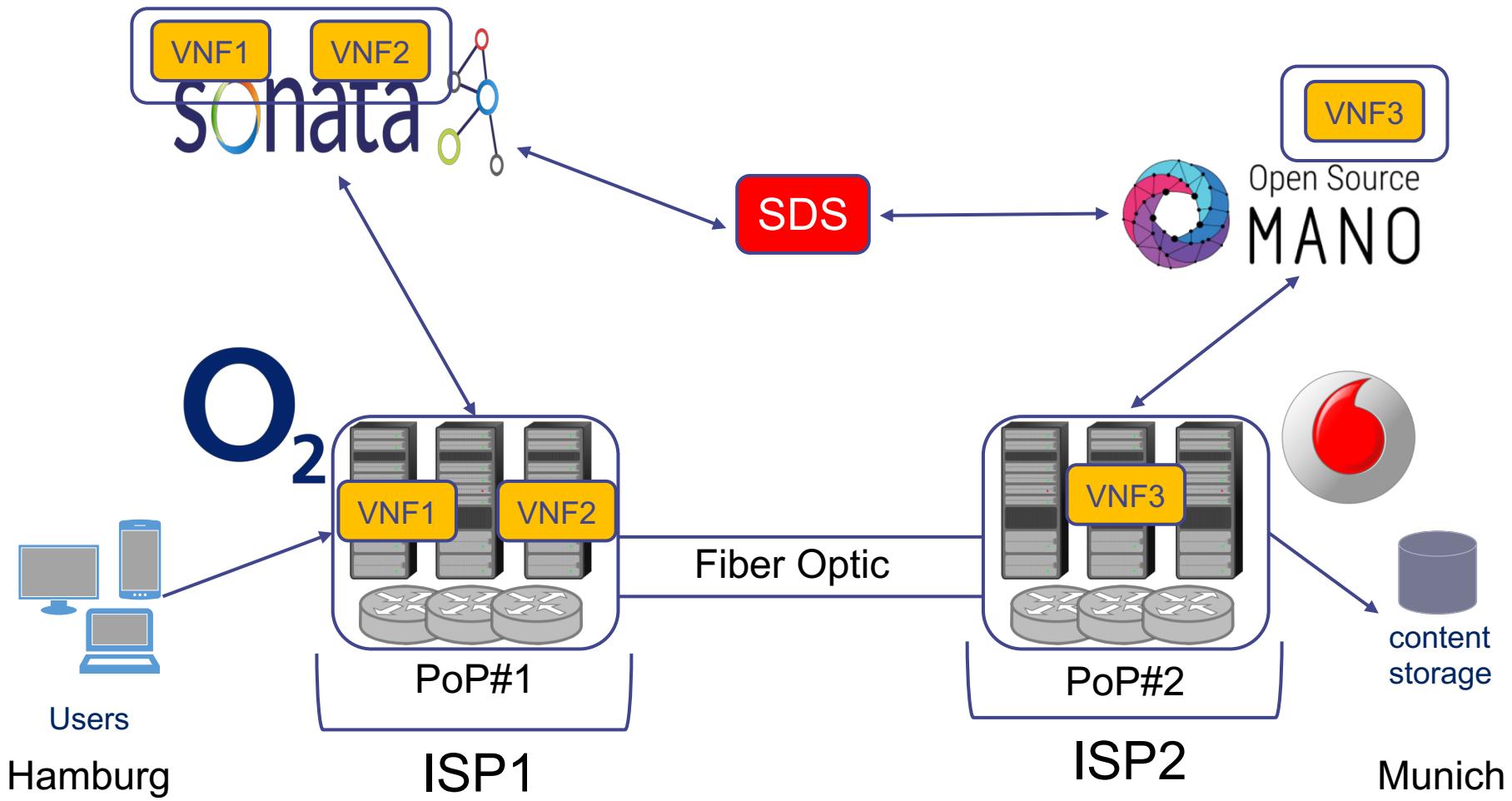
WP2: Service descriptor splitter (SDS)



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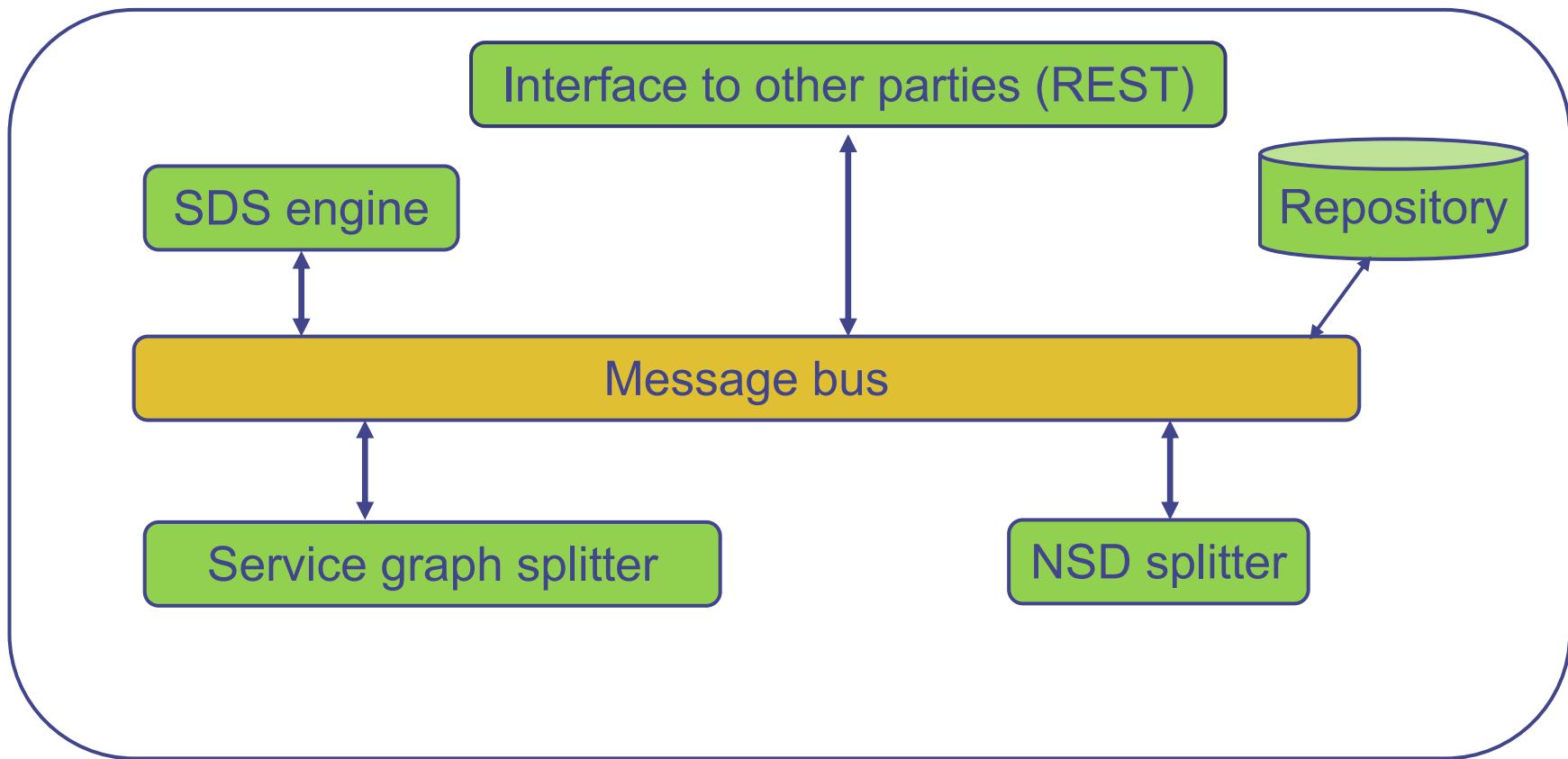


WP2 tasks

- T2.1: Requirements definition and architecture design
- T2.2: Investigation of service graph partitioning algorithms and libraries
- T2.3: Prototype implementation of SDS components
- T2.4: Proof of concept demonstration

T2.1

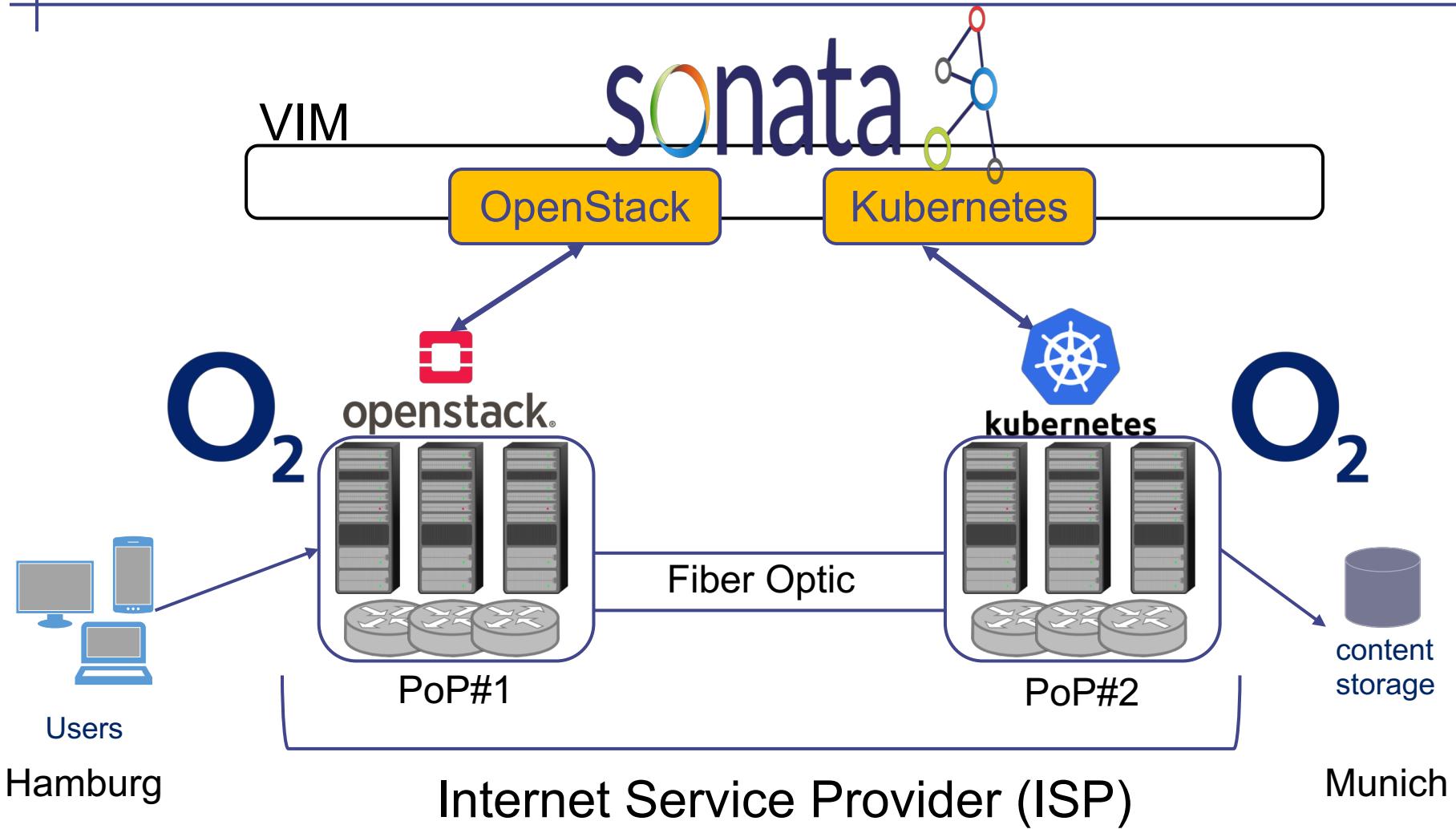
- Requirements definition and architecture design
- Possible SDS architecture



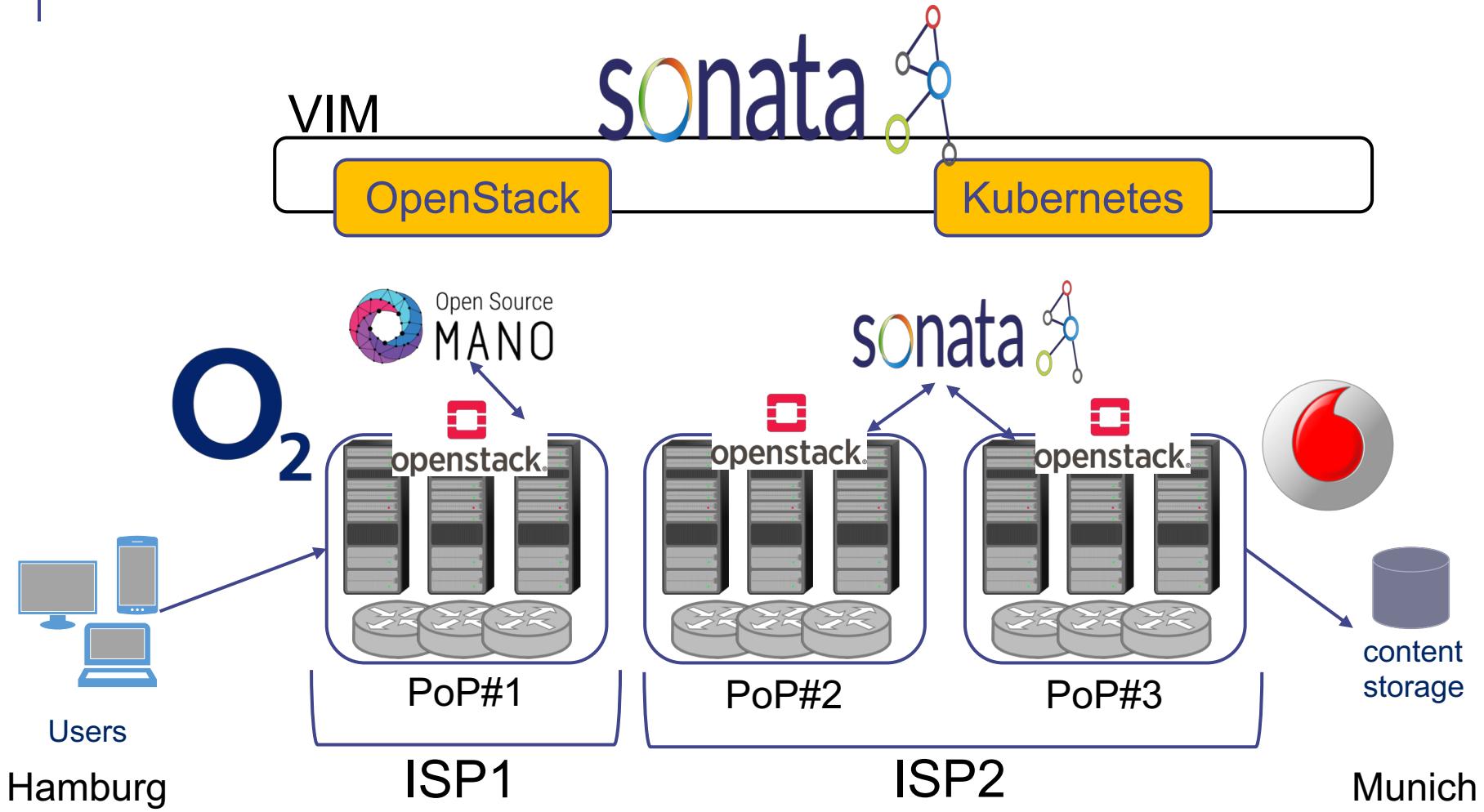
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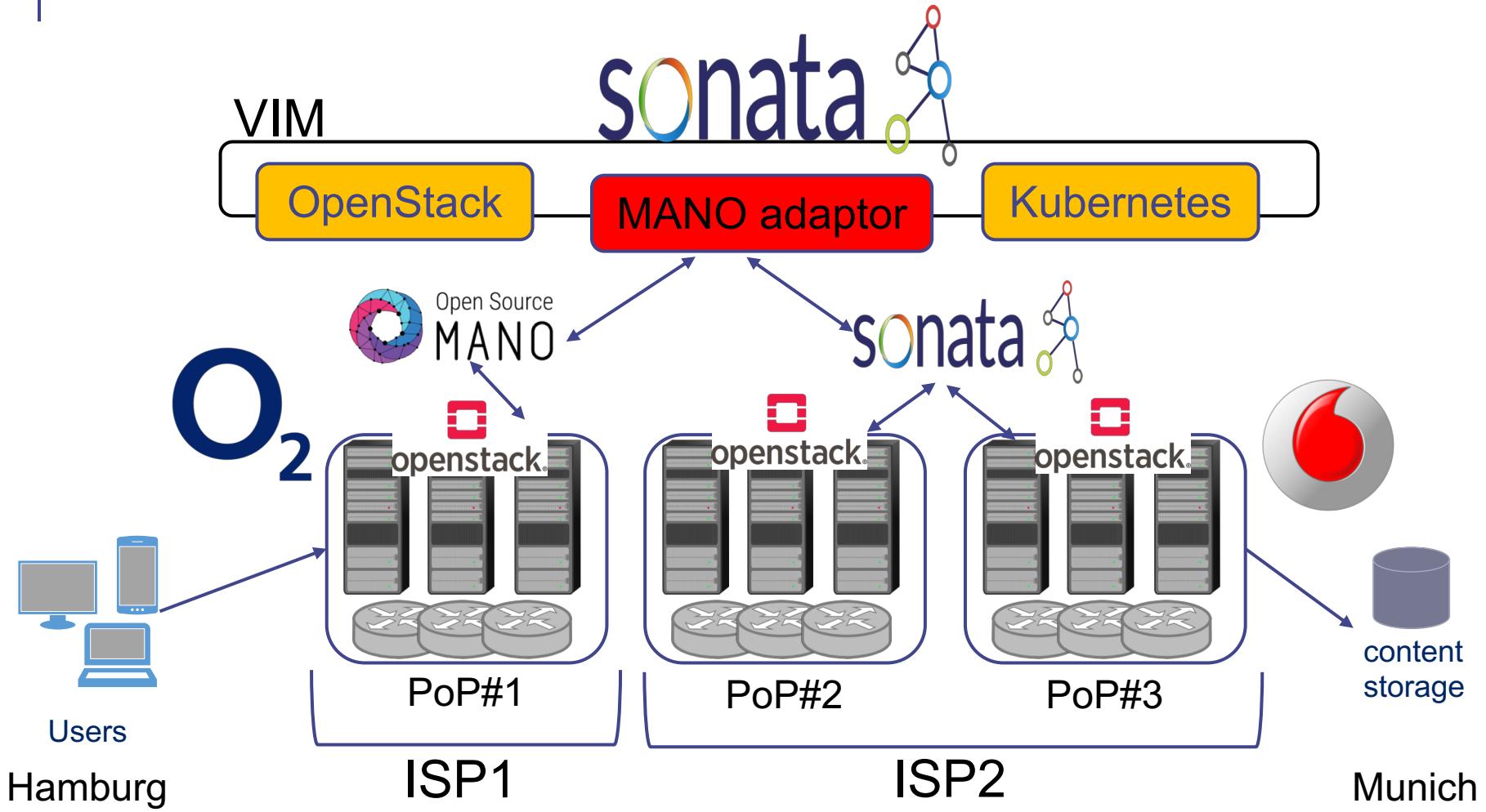
WP3: MANO scalability support



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MANO adaptor

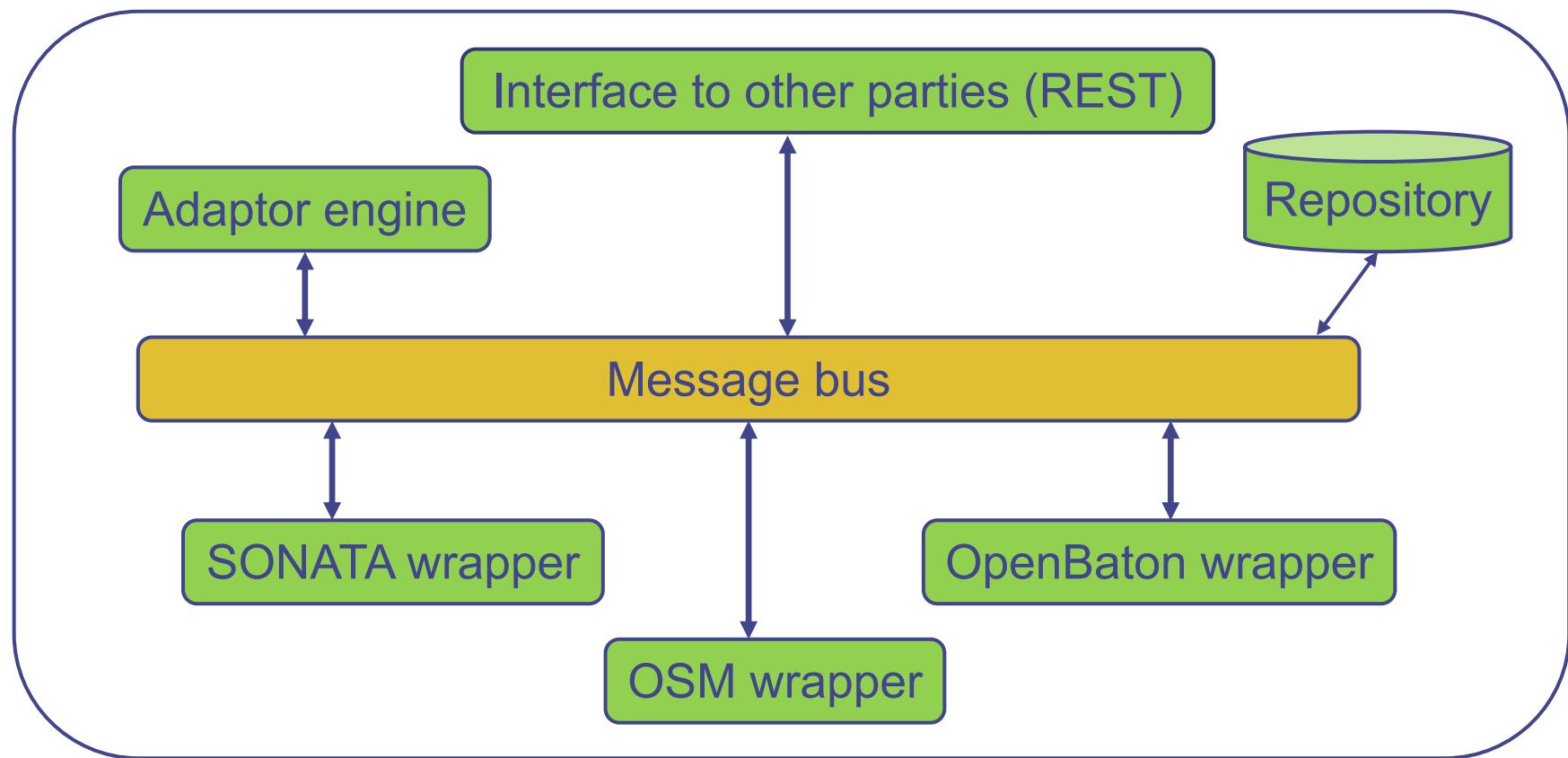
- Allows interaction between different instances of MANO frameworks
- Exposes the underlying MANOs service instantiation interfaces
- Retrieves monitoring information about the service status

WP3 tasks

- T3.1: Requirements definition and architecture design
- T3.2: Prototype implementation of adaptor components
- T3.3: Investigation of MANO scalability challenges
- T3.4: Proof of concept demonstration

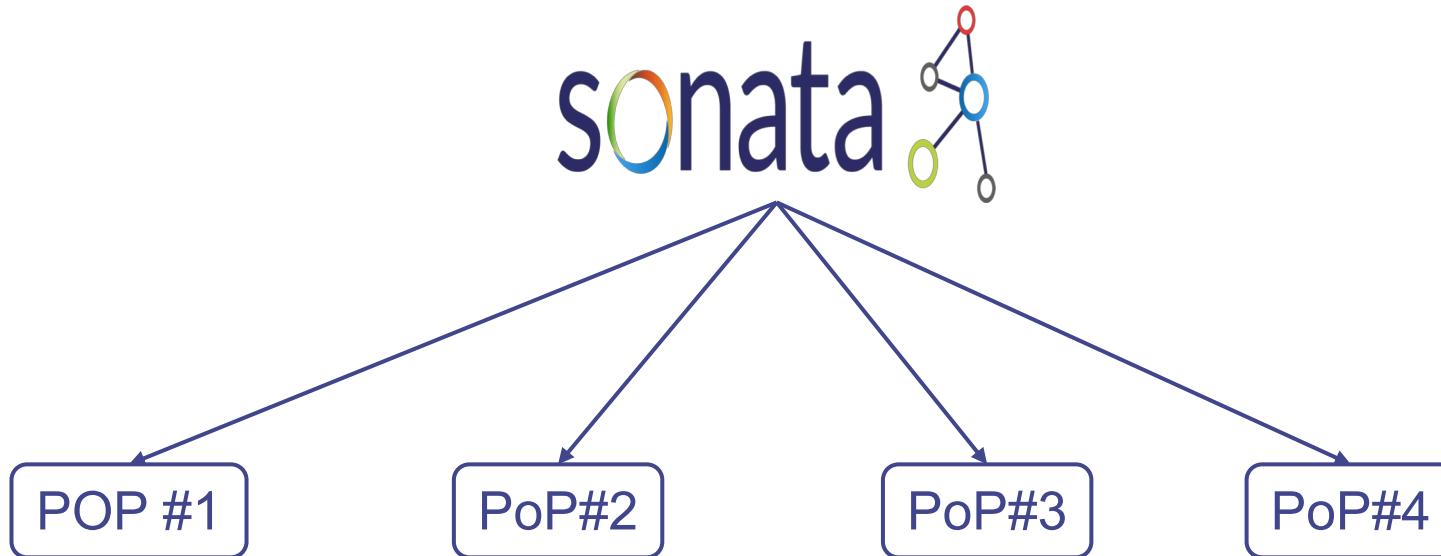
T3.1

- Requirements definition and architecture design
- Possible architecture for MANO adaptor



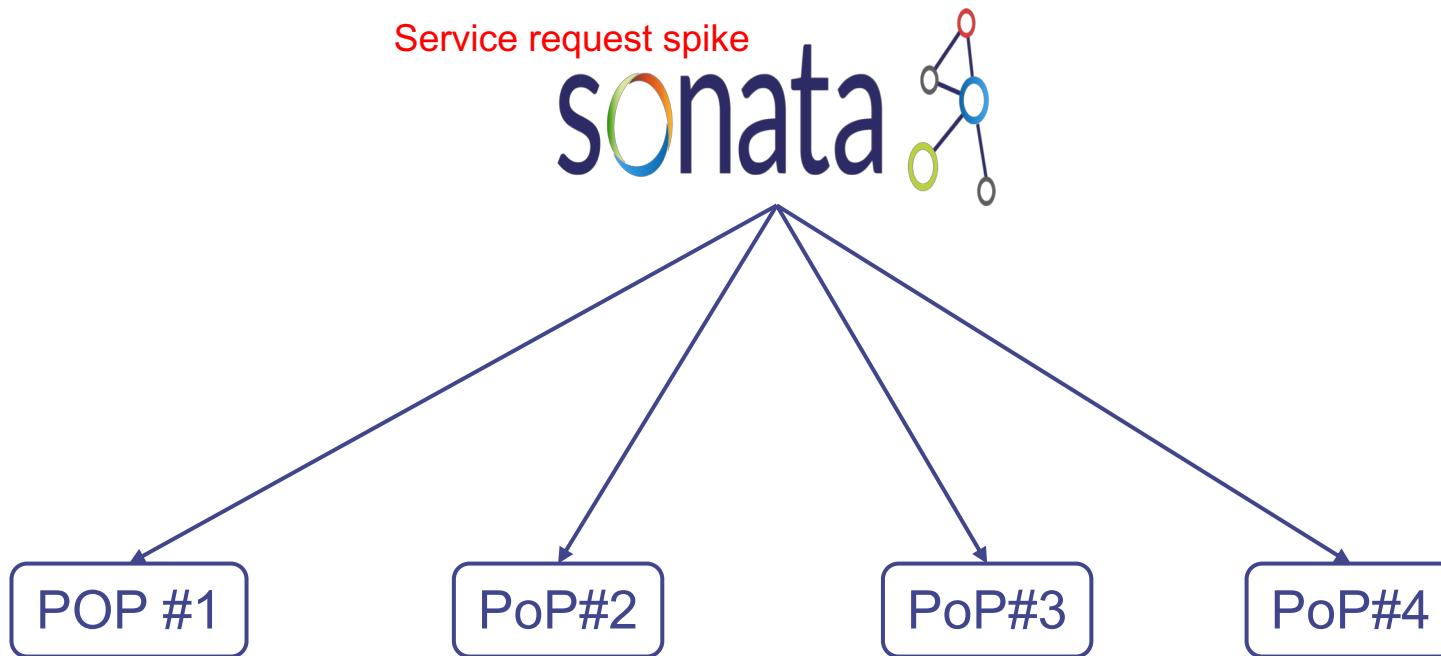
T3.3

- Investigation of MANO scalability challenges and solutions
- What is the optimal number of MANO in a system?
- How many hierarchal level do we need in a system?
- How to perform state management?



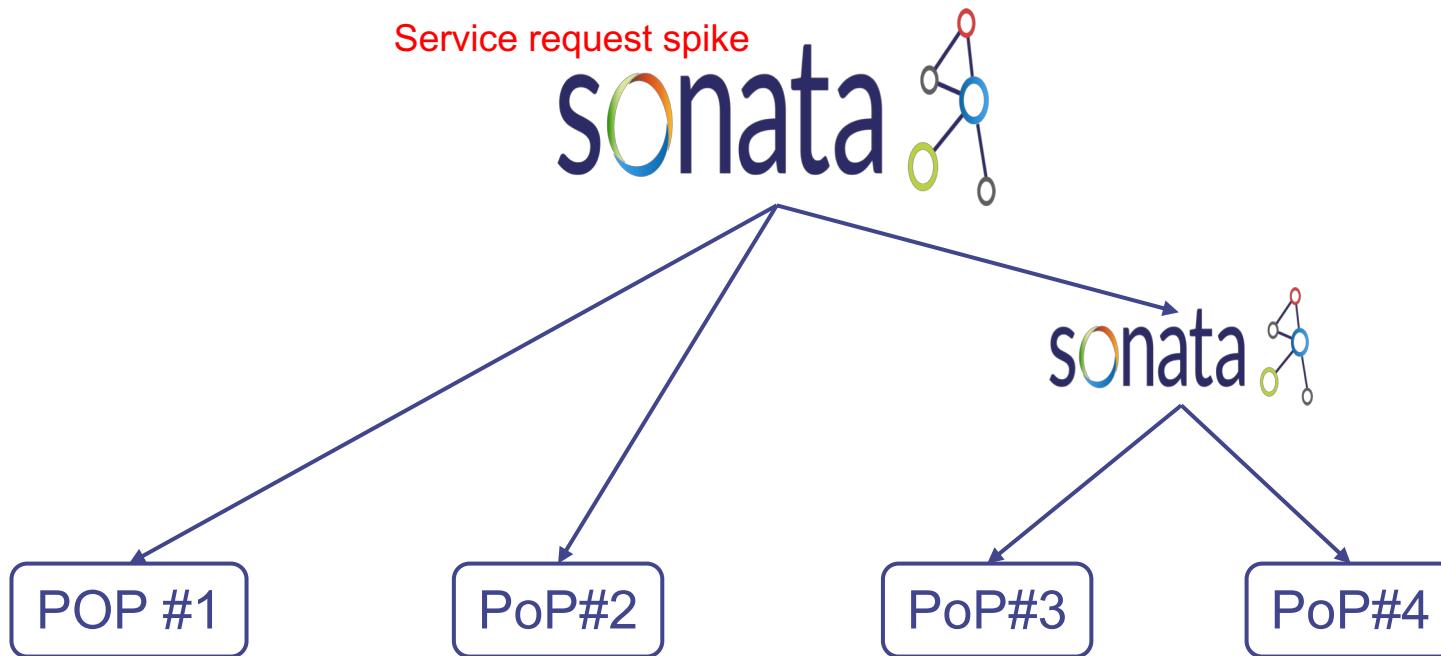
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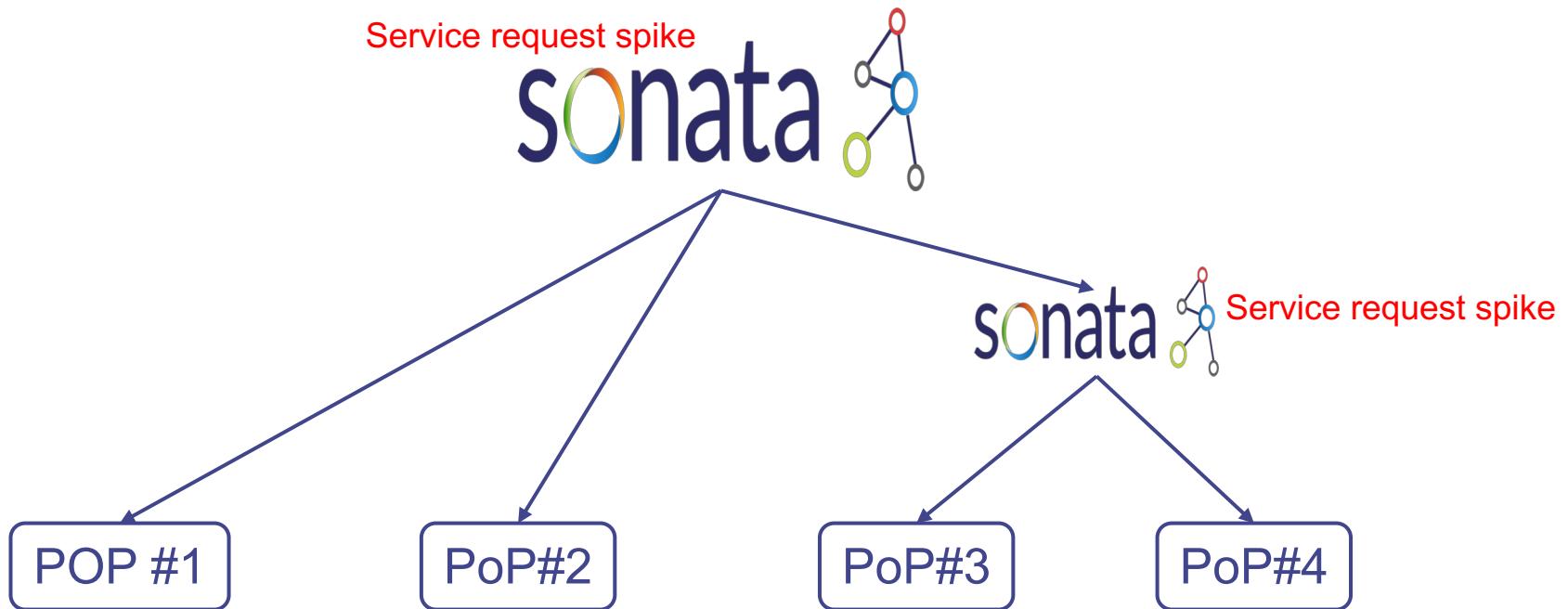
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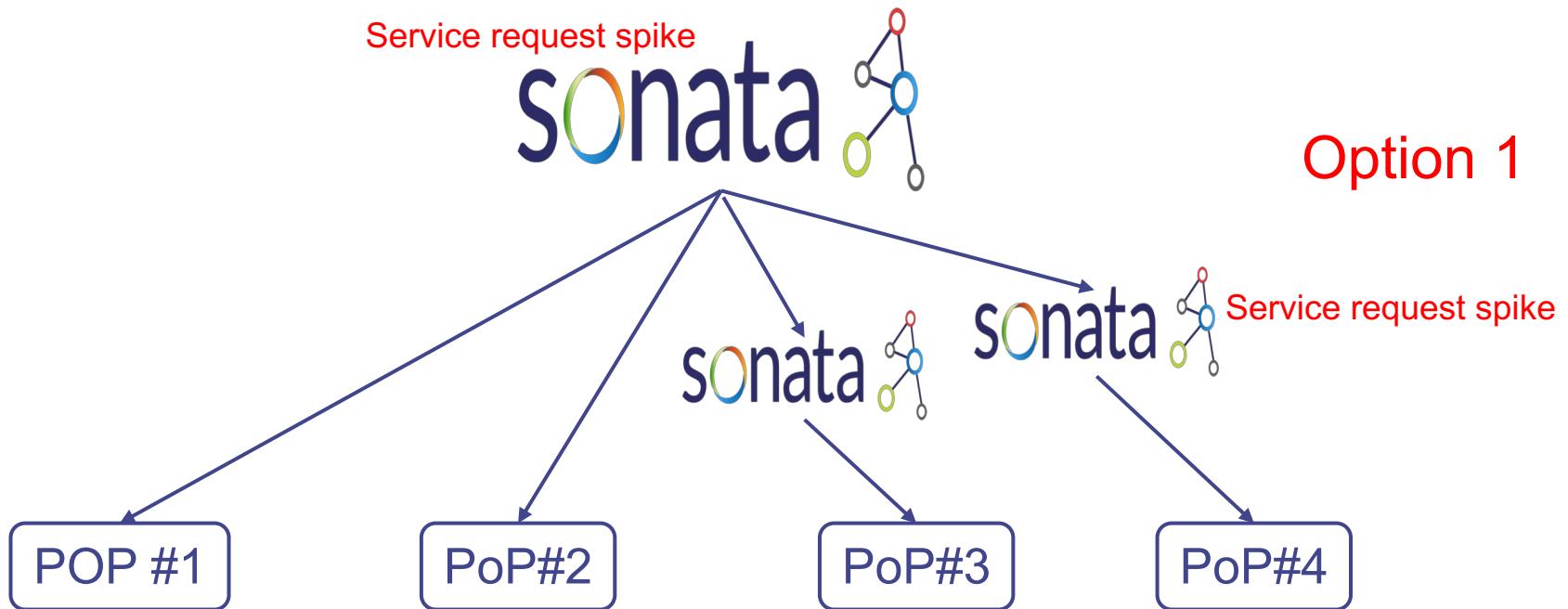


T3.3

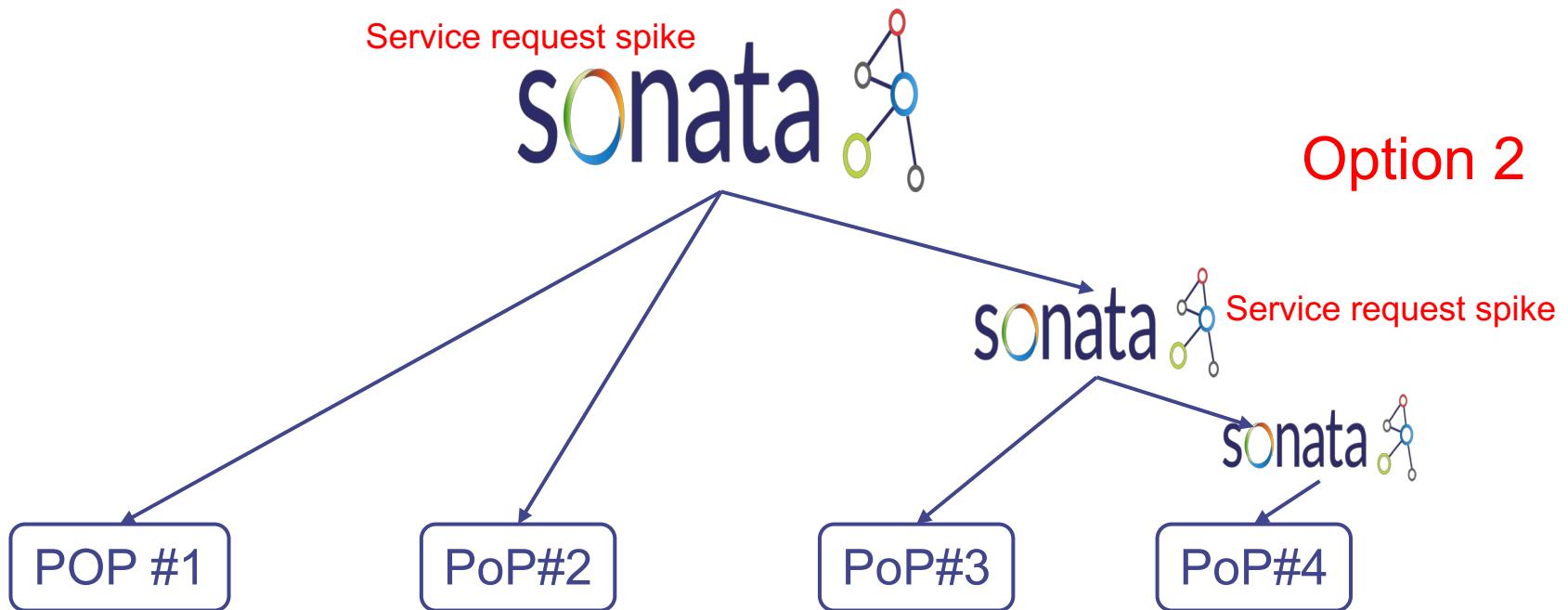
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- **Cross-WPs tasks**

Cross-WPs tasks

- CT1: Requirements definition of WPs integration
- CT2: Integration implementation of WPs
- CT3: Proof of concept demonstration