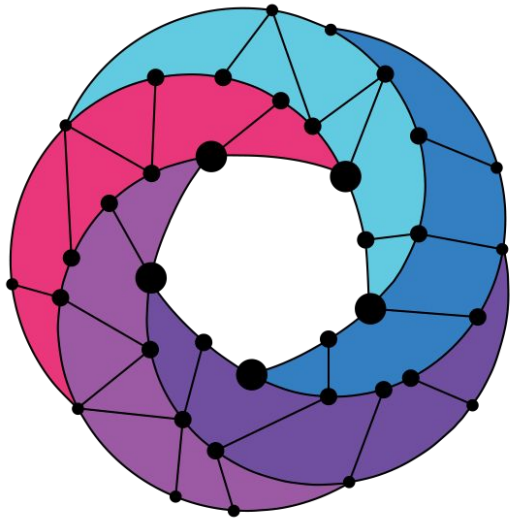

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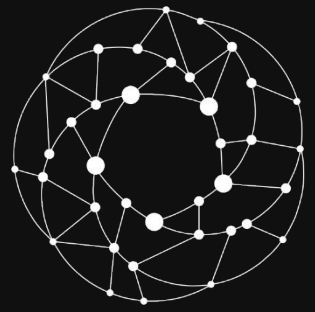
OSM Hackfest – Session 10
Service Function Chaining

Davide Borsatti (University of Bologna)

ETSI



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What is Service Function Chaining?

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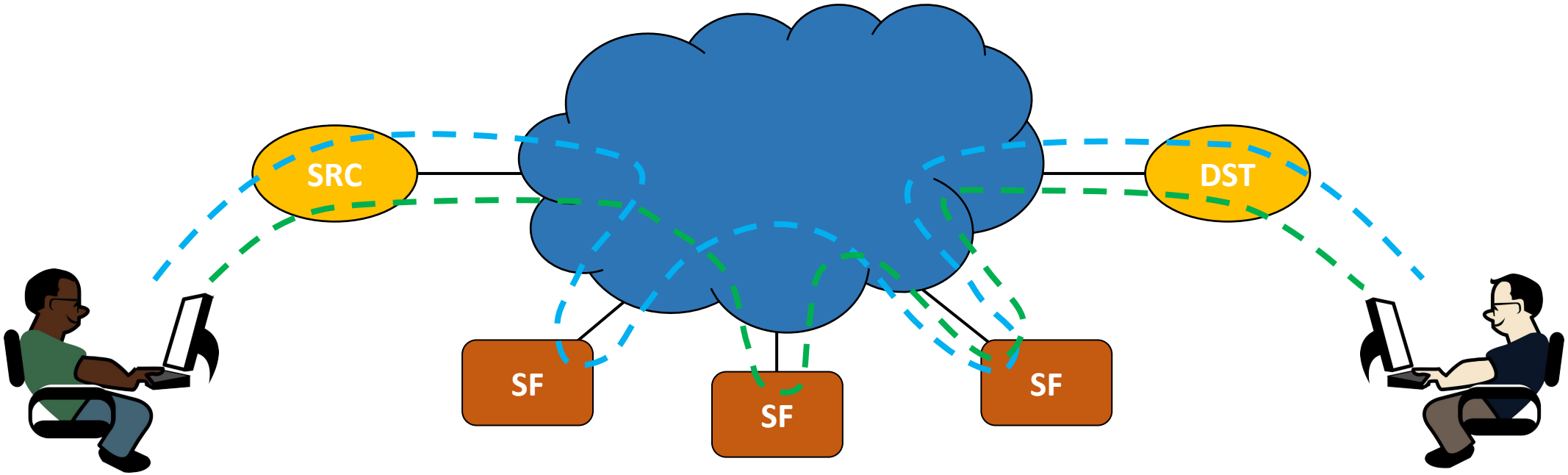
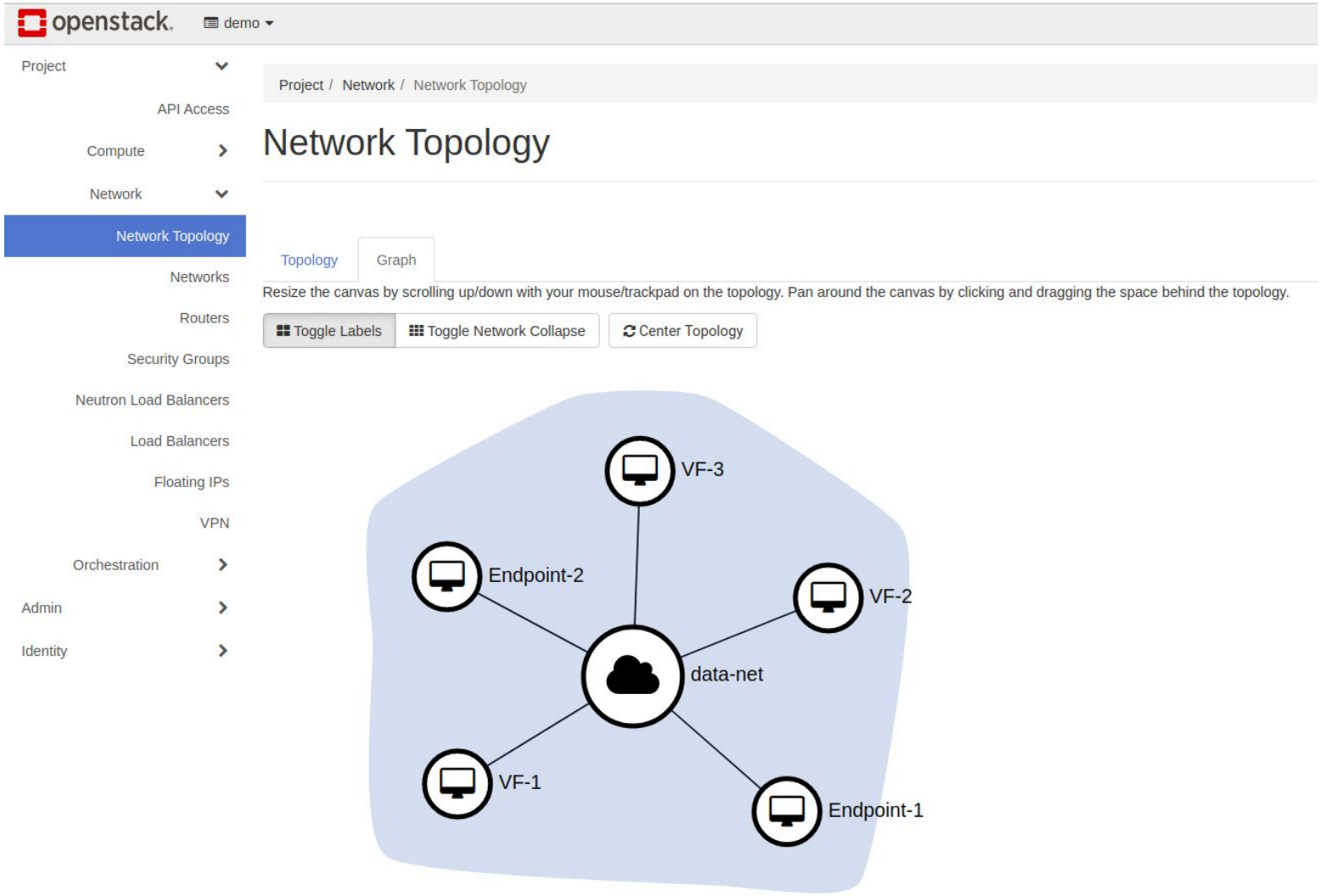
A couple words on Service Function Chaining (SFC)

Concatenation (*chaining*) of basic services or (virtualized) network/service functions…

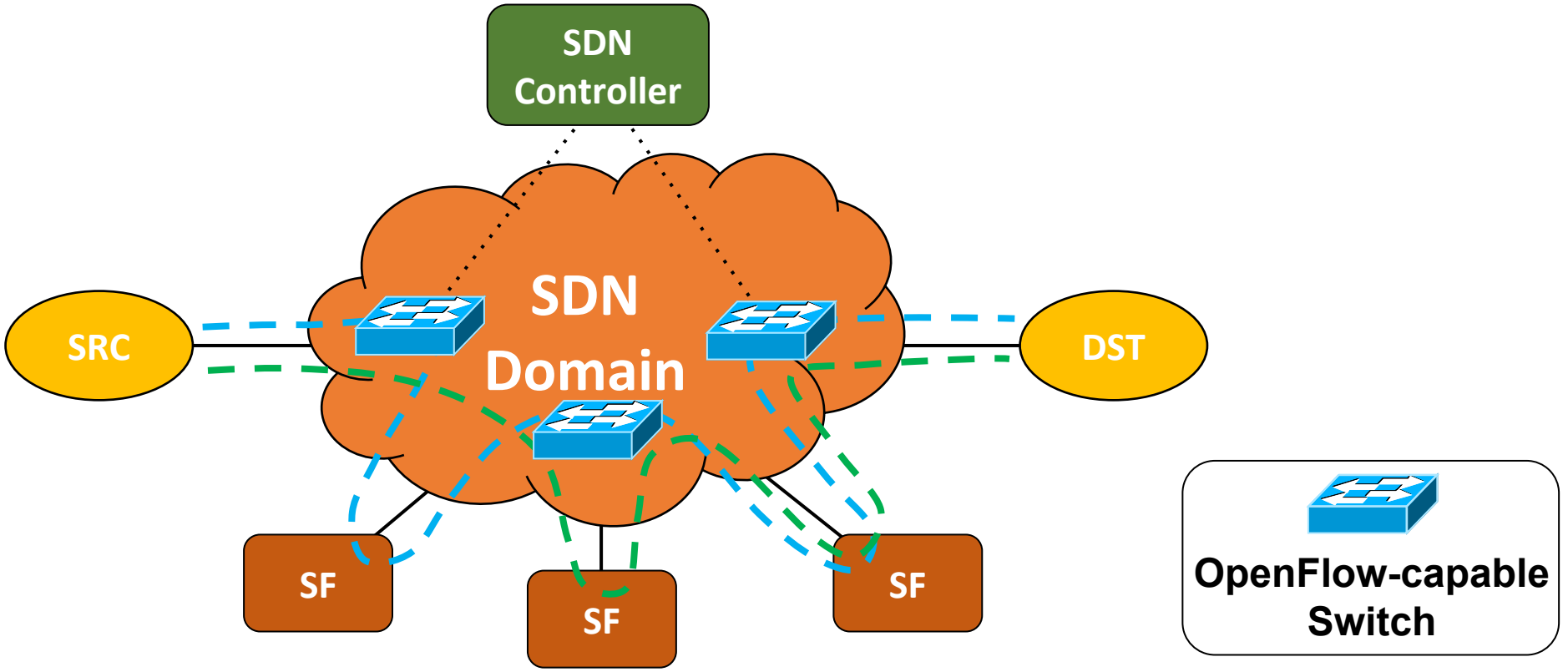


…in order to obtain a composite service, spanning over the whole network domain

A couple words on Service Function Chaining (SFC)

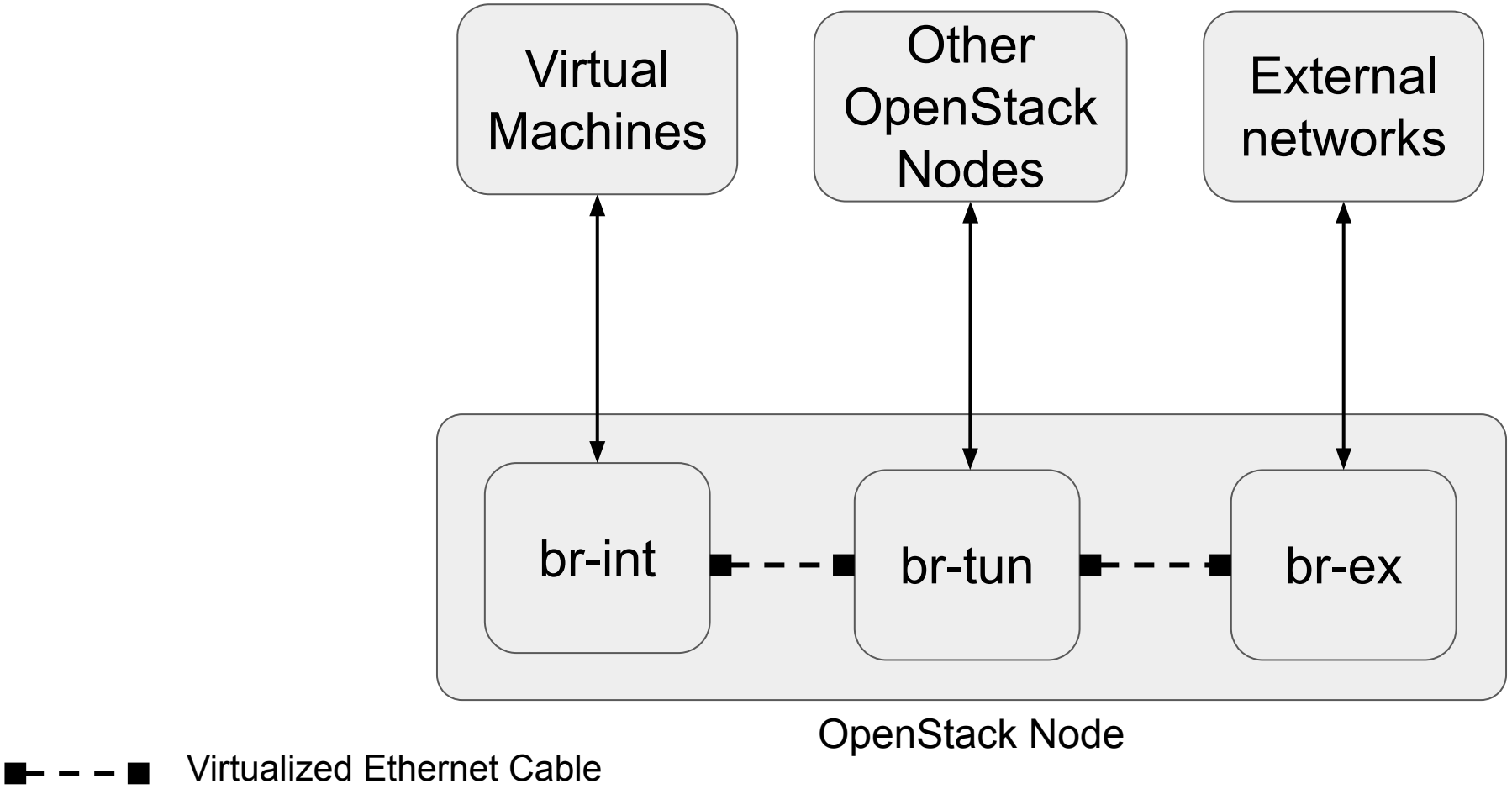


Service Function Chaining over an SDN Domain



Traffic steering is handled by OpenFlow-capable switches, controlled by a SDN Controller

Service Function Chaining over an SDN Domain



SFC Status in OSM

- Available since OSM Release 3
- SFC only available using:
  Openstack Queens (or higher) with Networking-SFC
- Only supports Asymmetrical Chains
- SFC Encapsulation using MPLS
- Traffic classification based in the following fields:

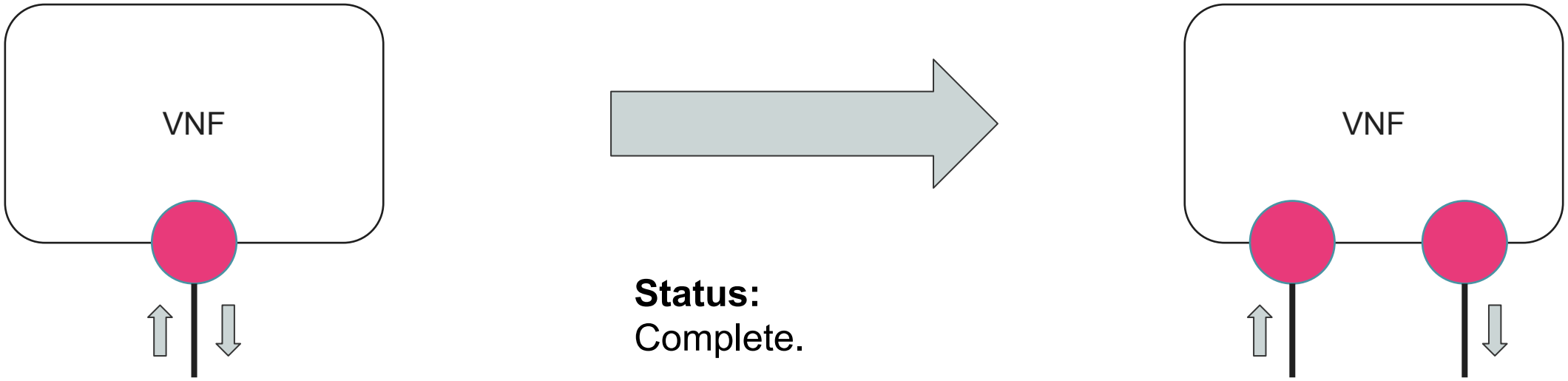
IP Protocol

Source IP Address — Destination IP Address

Source Port — Destination Port

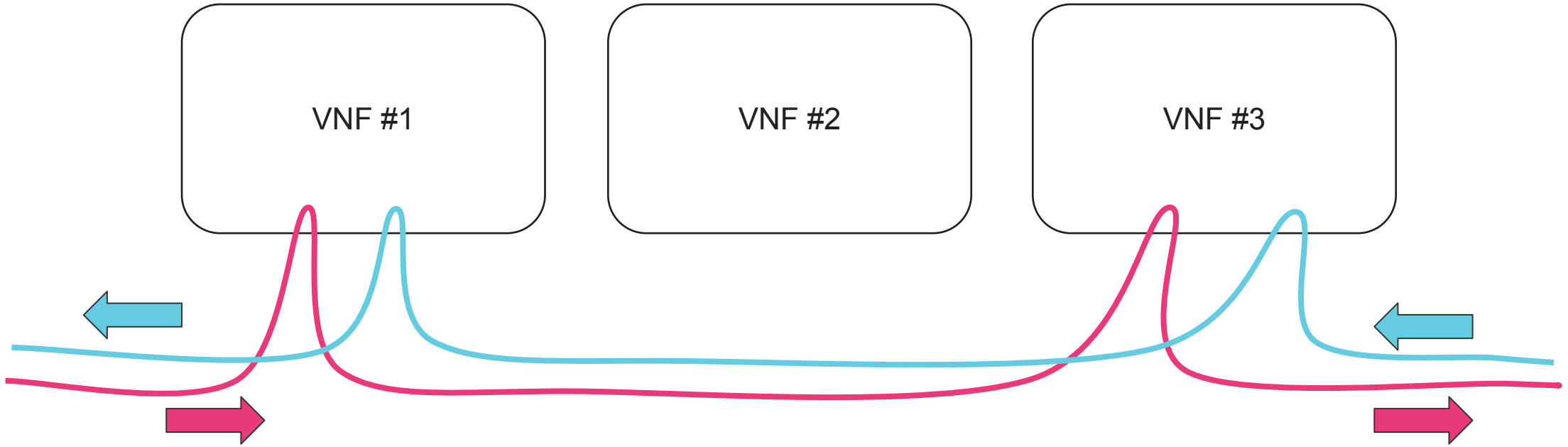
Separate ingress and egress ports

Modifying the Information Model and Resource Orchestrator



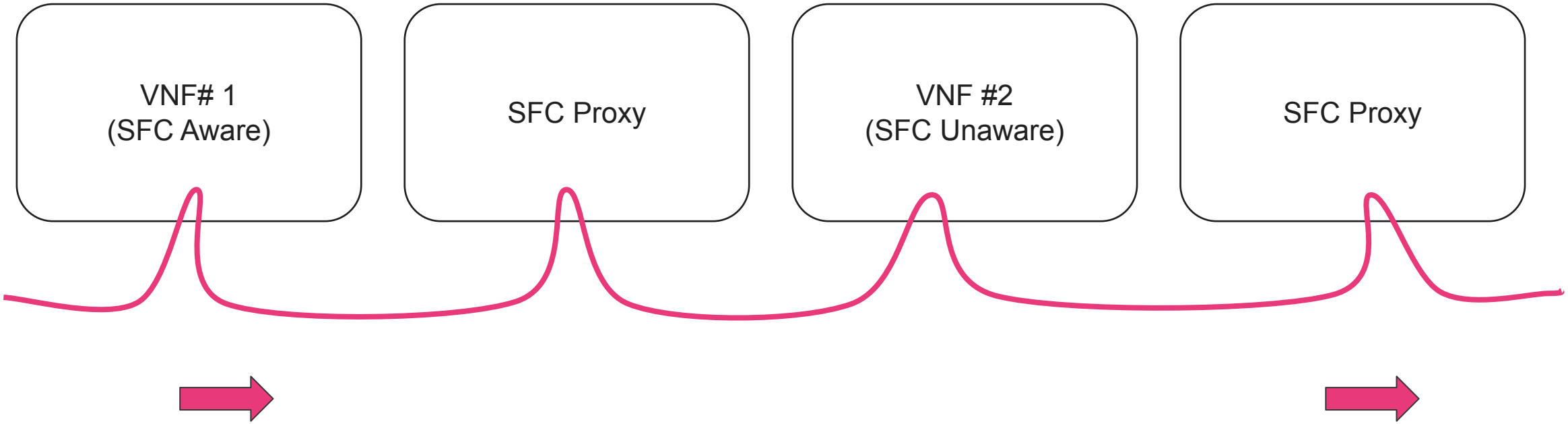
Symmetrical/Asymmetrical Chains

Currently only Asymmetrical Chains are supported.
Status: In development.



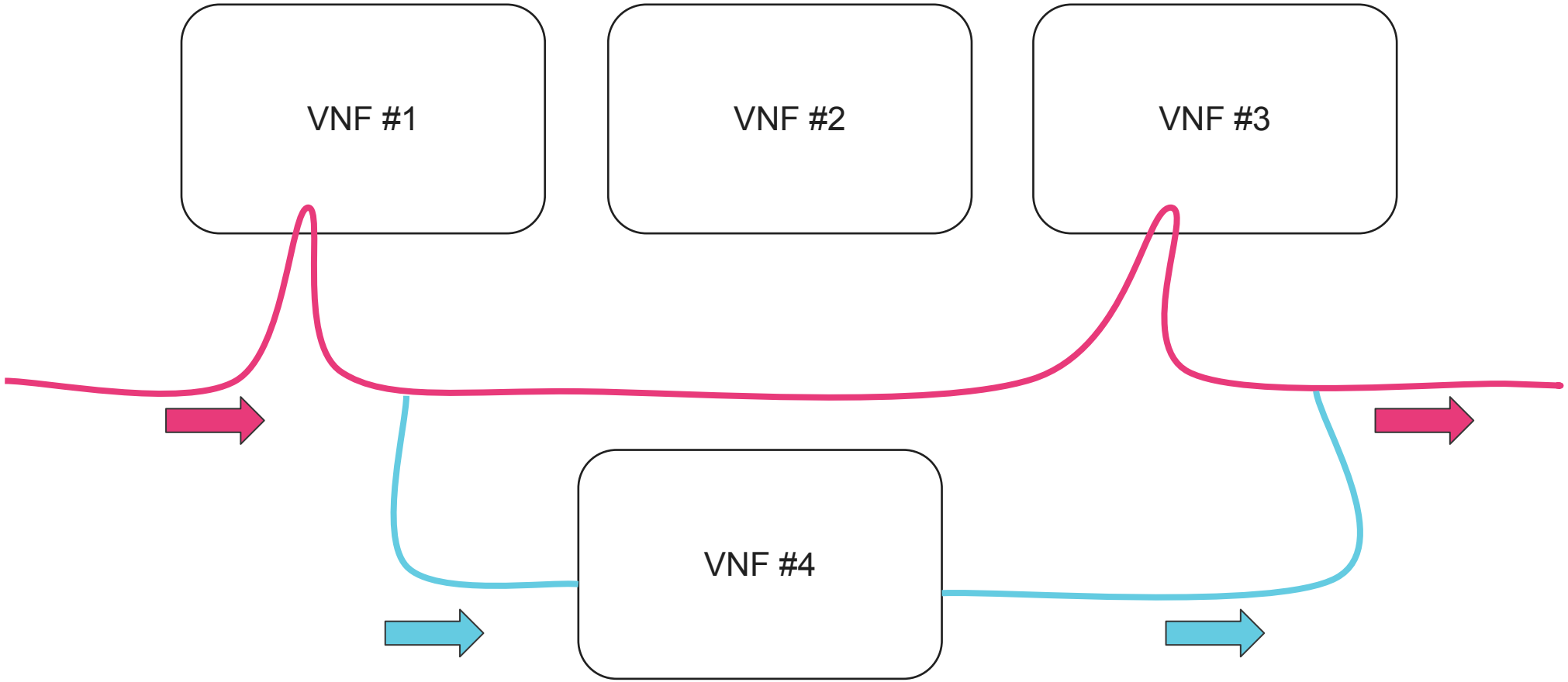
Non-Transparent Service Functions

Currently not supported.
Status: Research ongoing.



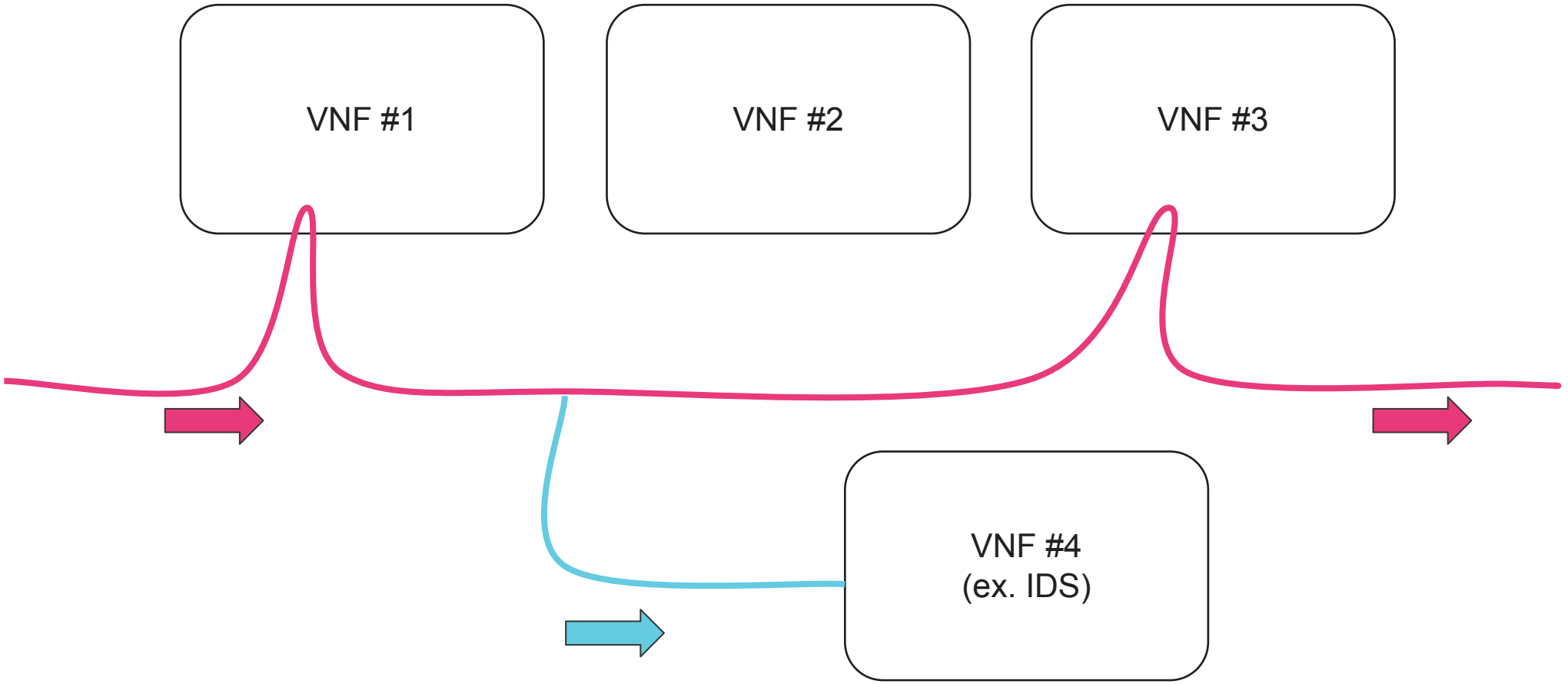
Branching and Joining

Currently not supported.
Status: Research ongoing.



Service Function Tap

Currently not supported.
Status: Research ongoing.



OSM SFC descriptors

```
rsp: #redered service paths
      - id: rsp-id
        name: rsp-name
        vnfd-connection-point-ref:
        - member-vnf-index-ref: vnf-index
          vnfd-id-ref: vnf-id
          order: order-int
          vnfd-egress-connection-point-ref: egress-cp
          vnfd-ingress-connection-point-ref: ingress-cp
```

OSM SFC descriptors

```
rsp: #redered service paths
      - id: rsp-id
        name: rsp-name
        vnfd-connection-point-ref:
        - member-vnf-index-ref: vnf-index
          vnfd-id-ref: vnf-id
          order: order-int
          vnfd-egress-connection-point-ref: egress-cp
          vnfd-ingress-connection-point-ref: ingress-cp
```

List of VNFs composing the Rendered Service Path

OSM SFC descriptors

```
rsp: #redered service paths
      - id: rsp-id
        name: rsp-name
        vnfd-connection-point-ref:
        - member-vnf-index-ref: vnf-index
          vnfd-id-ref: vnf-id
          order: order-int
          vnfd-egress-connection-point-ref: egress-cp
          vnfd-ingress-connection-point-ref: ingress-cp
```

Identifier of the VNFD and its index inside the “constituent-vnfd” list

OSM SFC descriptors

```
rsp: #redered service paths
      - id: rsp-id
        name: rsp-name
        vnfd-connection-point-ref:
        - member-vnf-index-ref: vnf-index
          vnfd-id-ref: vnf-id
          order: order-int
          vnfd-egress-connection-point-ref: egress-cp
          vnfd-ingress-connection-point-ref: ingress-cp
```

Specifies the order of the different VNFs inside the RSP

OSM SFC descriptors

```
rsp: #redered service paths
      - id: rsp-id
        name: rsp-name
        vnfd-connection-point-ref:
        - member-vnf-index-ref: vnf-index
          vnfd-id-ref: vnf-id
          order: order-int
          vnfd-egress-connection-point-ref: egress-cp
          vnfd-ingress-connection-point-ref: ingress-cp
```

Specifies from which connection point the traffic will enter and exit the VNF

OSM SFC descriptors

```
- classifier:
    - id: classifier-id
      name: classifier-name
      match-attributes:
      - destination-ip-address: dst-ip
        destination-port: dst-port
        id: match-id
        ip-proto: ip-proto-id
        source-ip-address: src-ip
        source-port: src-ip
      rsp-id-ref: rsp-id
      member-vnf-index-ref: vnf-index
      vnfd-connection-point-ref: vnf-cp
      vnfd-id-ref: vnf-id
```

Specifies the characteristics of the traffic we want to steer inside the RSP

OSM SFC descriptors

```
- classifier:
      - id: classifier-id
        name: classifier-name
        match-attributes:
        - destination-ip-address: dst-ip
          destination-port: dst-port
          id: match-id
          ip-proto: ip-proto-id
          source-ip-address: src-ip
          source-port: src-ip
        rsp-id-ref: rsp-id
        member-vnf-index-ref: vnf-index
        vnfd-connection-point-ref: vnf-cp
        vnfd-id-ref: vnf-id
```

Desired IP Protocol numberic identifier.
Ex:
1 → ICMP
6 → TCP
17 → UDP

OSM SFC descriptors

```
- classifier:
    - id: classifier-id
      name: classifier-name
      match-attributes:
      - destination-ip-address: dst-ip
        destination-port: dst-port
        id: match-id
        ip-proto: ip-proto-id
        source-ip-address: src-ip
        source-port: src-ip
      rsp-id-ref: rsp-id
      member-vnf-index-ref: vnf-index
      vnfd-connection-point-ref: vnf-cp
      vnfd-id-ref: vnf-id
```

Source and Destination IP addresses and port (if TCP or UDP)

OSM SFC descriptors

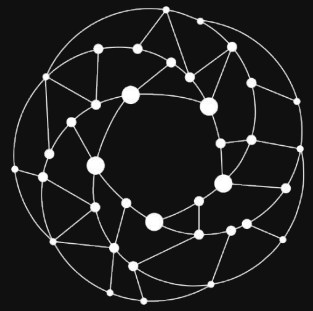
```
- classifier:
      - id: classifier-id
        name: classifier-name
        match-attributes:
        - destination-ip-address: dst-ip
          destination-port: dst-port
          id: match-id
          ip-proto: ip-proto-id
          source-ip-address: src-ip
          source-port: src-ip
        rsp-id-ref: rsp-id
        member-vnf-index-ref: vnf-index
        vnfd-connection-point-ref: vnf-cp
        vnfd-id-ref: vnf-id
```

RSP linked to this classifier

OSM SFC descriptors

```
- classifier:
      - id: classifier-id
        name: classifier-name
        match-attributes:
        - destination-ip-address: dst-ip
          destination-port: dst-port
          id: match-id
          ip-proto: ip-proto-id
          source-ip-address: src-ip
          source-port: src-ip
        rsp-id-ref: rsp-id
        member-vnf-index-ref: vnf-index
        vnfd-connection-point-ref: vnf-cp
        vnfd-id-ref: vnf-id
```

VNF and relative connection point from which the “matching” flows will enter the RSP



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Hands-on

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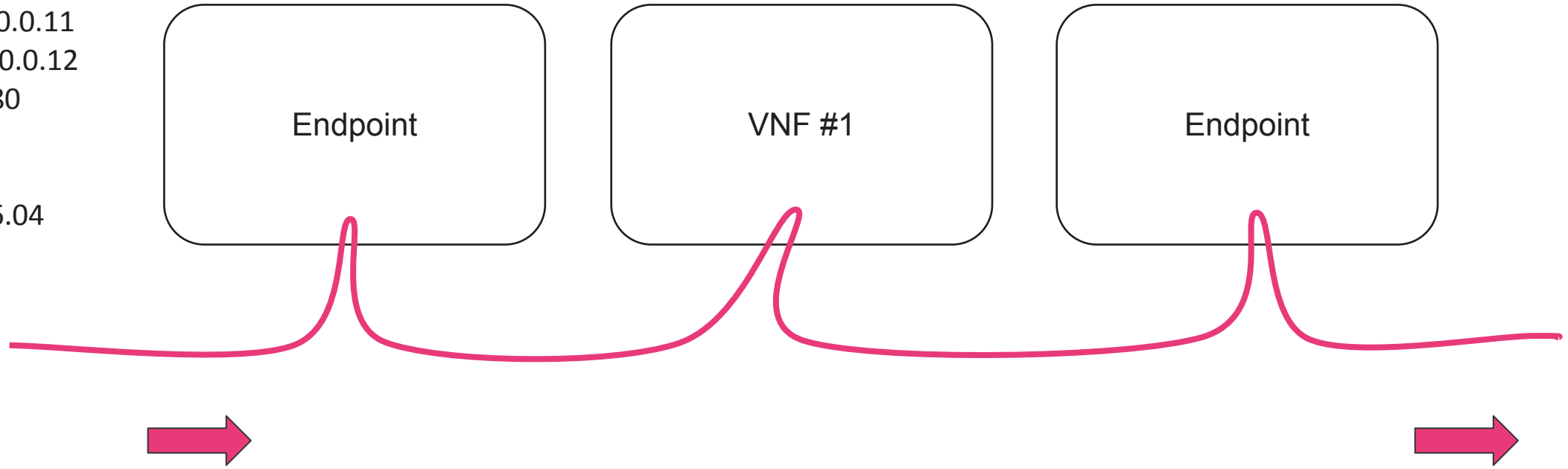
Hands On scenario

Flow Classifier #1:

- IP Proto: TCP
- Src IP: 10.0.0.11
- Dst IP: 10.0.0.12
- Dst Port: 80

Image:

- ubuntu-16.04



SFC descriptors

Download and onboard on your OSM the following descriptors:

http://osm-download.etsi.org/ftp/osm-6.0-six/8th-hackfest/packages/endpoint_vnfd.tar.gz

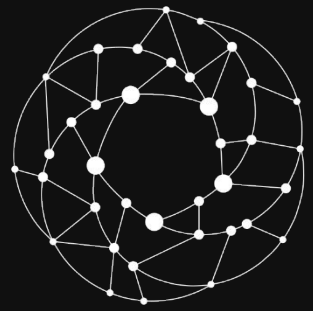
http://osm-download.etsi.org/ftp/osm-6.0-six/8th-hackfest/packages/vnf_mpls_vnfd.tar.gz

http://osm-download.etsi.org/ftp/osm-6.0-six/8th-hackfest/packages/sfc_mpls_nsd.tar.gz

SFC descriptors

```
- classifier:
      - id: class1
        match-attributes:
        - destination-ip-address: 10.10.10.12
          destination-port: 80
          id: match1
          ip-proto: 6
          source-ip-address: 10.10.10.11
          source-port: 0
        member-vnf-index-ref: 1
        name: class1-name
        rsp-id-ref: rsp1
        vnfd-connection-point-ref: vnf-data
        vnfd-id-ref: endpoint_vnfd
```

```
rsp: #redered service paths
      - id: rsp1
        name: rsp1-name
        vnfd-connection-point-ref:
        - member-vnf-index-ref: 3
          order: 0
          vnfd-egress-connection-point-ref: vnf-cp0
          vnfd-id-ref: vnf_nsh_vnfd
          vnfd-ingress-connection-point-ref: vnf-cp0
```



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Segment Routing with OSM Demo

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Segment Routing For SFC

- A Source Routing approach to Service Function Chaining
- The whole list of SF of the chain is inserted directly from the ingress node of the SR domain by means of a segment list. Each segment representing a function of the chain
- These segment identifiers can be expressed in two ways:
  - MPLS labels
  - IPv6 addresses

SRv6 descriptors

http://osm-download.etsi.org/ftp/osm-6.0-six/8th-hackfest/packages/clean_vnfd.tar.gz

http://osm-download.etsi.org/ftp/osm-6.0-six/8th-hackfest/packages/srv6_vnfd.tar.gz

http://osm-download.etsi.org/ftp/osm-6.0-six/8th-hackfest/packages/4node_srv6_nsd.tar.gz

SRv6 actions - *create-chain*

```
vnf-configuration:
  juju:
    charm: srv6
  config-primitive:
  - name: create-chain
    parameter:
    - name: dest
      data-type: STRING
      default-value: ''
      mandatory: true
    - name: list
      data-type: STRING
      default-value: ''
      mandatory: true
```

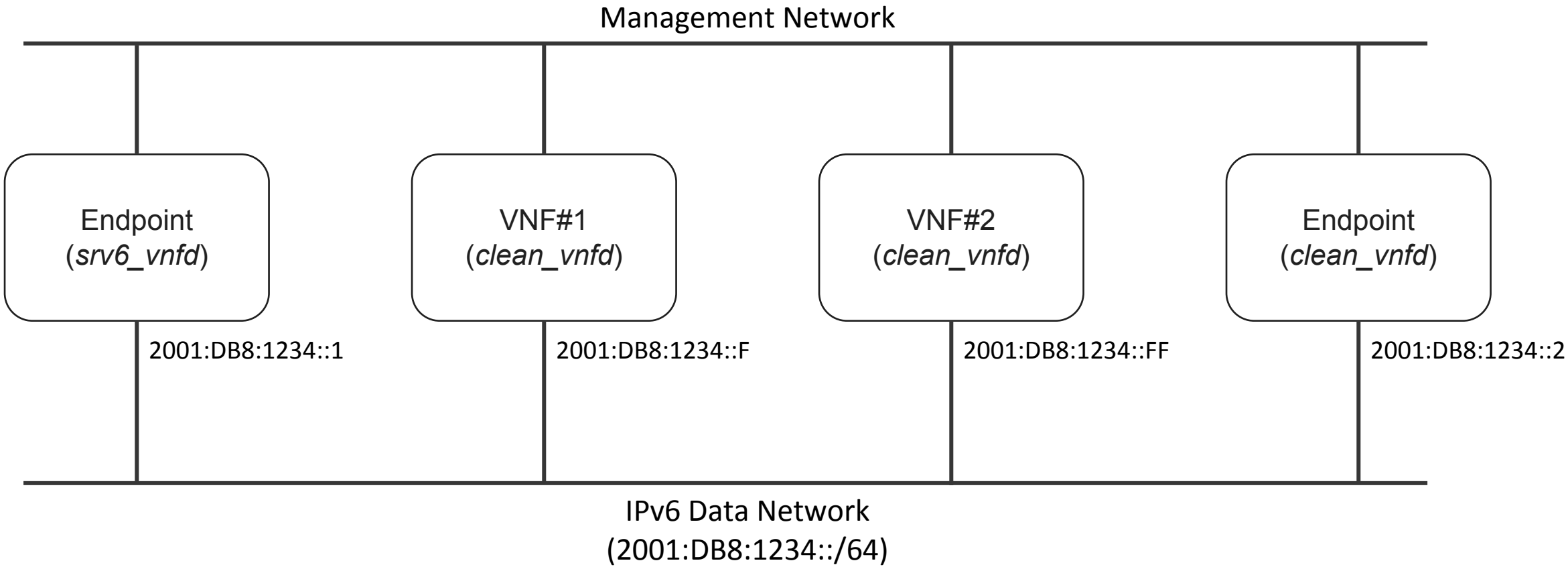
```
    - name: source
      data-type: STRING
      default-value: ''
      mandatory: false
    - name: proto
      data-type: STRING
      default-value: ''
      mandatory: false
    - name: port-dest
      data-type: STRING
      default-value: ''
      mandatory: false
    - name: port-source
      data-type: STRING
      default-value: ''
      mandatory: false
```

SRv6 actions - *del-chain, update-chain*

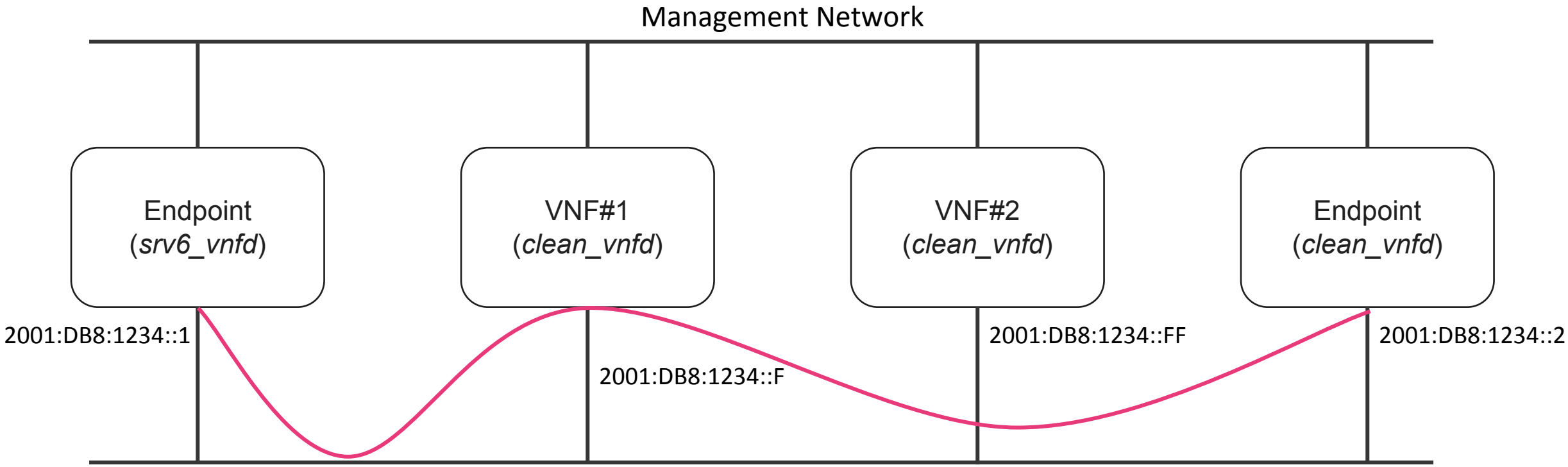
```
vnf-configuration:
  juju:
    charm: srv6
  config-primitive:
  - name: del-chain
    parameter:
    - name: dest
      data-type: STRING
      default-value: ''
      mandatory: true
```

```
vnf-configuration:
  juju:
    charm: srv6
  config-primitive:
  - name: encap-chain
    parameter:
    - name: dest
      data-type: STRING
      default-value: ''
      mandatory: true
    - name: list
      data-type: STRING
      default-value: ''
      mandatory: true
```

SRv6 Hands on - Scenario (*4node_srv6_nsd*)



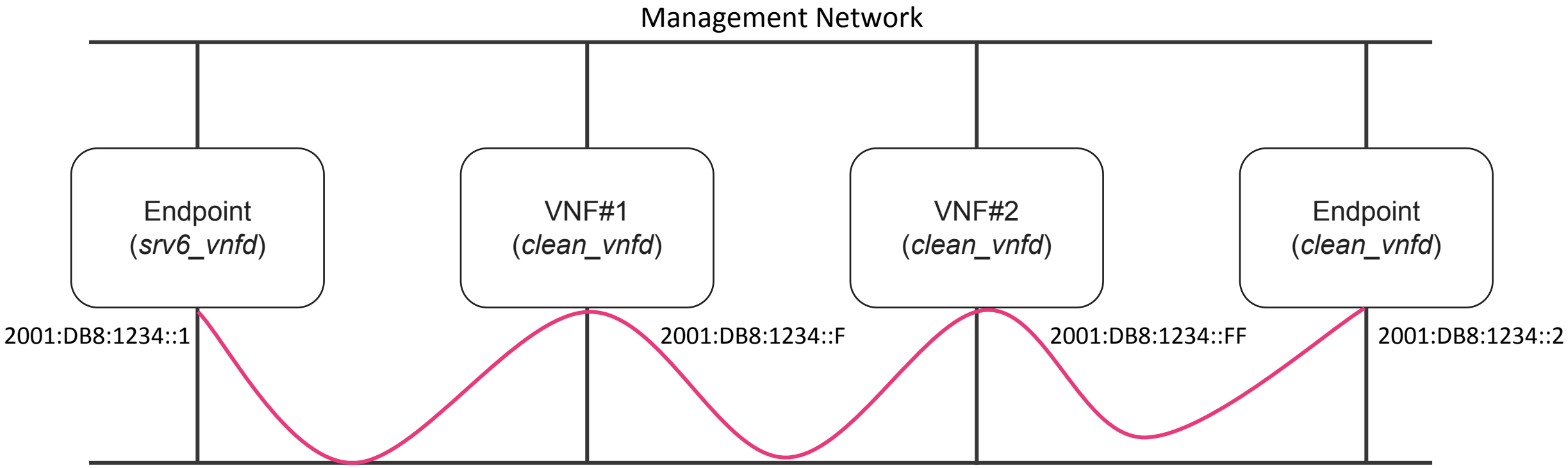
SRv6 Hands on - First Chain



SRv6 chain#1 :

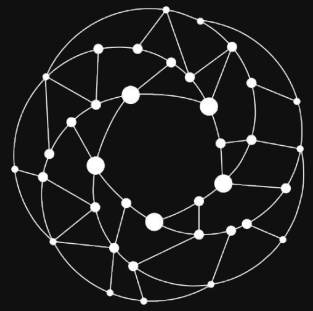
- IP Proto: TCP
- Src IP: 2001:DB8:1234::1
- Dst IP: 2001:DB8:1234::2
- Dst Port: 80
- VNF List: 2001:DB8:1234::F

SRv6 Hands on - Updated Chain



SRv6 chain#2 :

- IP Proto: TCP
- Src IP: 2001:DB8:1234::1
- Dst IP: 2001:DB8:1234::2
- Dst Port: 80
- VNF List: 2001:DB8:1234::F, 2001:DB8:1234::FF



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The End

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