DIGITAL SERVICE

DIGITAL NEXT-BUSINESS

ATII APAC Telecom Innovation Initiative

Telkom Indonesia
the world in your hand

Establishing Service Function Chaining Architecture on OpenStack for Internet VNF Use-case

A joint research & PoC activities among APAC(Asia-Pacific) Telco Service Provider

Biznet GioCloud · Biznet · Mellanox TECHNOLOGIES · BANK BRI · OSF OpenStack Foundation

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About Us

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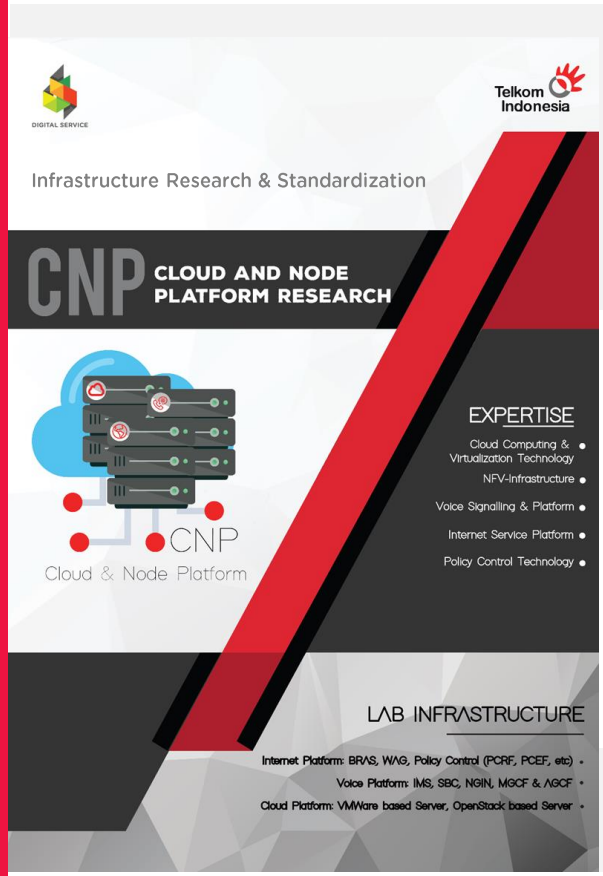

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29 years old

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Ibrahim-zein-abdillah

Employment Record :

- (2014 – Present) PT. Telekomunikasi Indonesia, Tbk.
  - Eng. 2 Service Control – DDS/MDD (2017 – Present)
  - Eng. 3 Service Control – IDeC/DDS (2014 - 2017)
- (2012-2013) PT. Huawei Services
  - OSS Competence Center Engineer (2013)
  - NOC SLM Carrier And Roaming Engineer (2012 – 2013)

Education :

Bachelor of Engineering (B.Eng.), Telecommunication & Multimedia – Electrical Engineering [2018 – 2012]

Award :

- ASEAN Outstanding Engineering Award [2018]
- Top 5 Best Employee Telkom Group BP V [2019]

Certification :

[2019] MTCNA (MikroTik Certified Network Associate), *MikroTik*

[2018] CCNA (Cisco Certified Network Associate-Routing & Switching), *Cisco*

[2017] OpenStack - RHCSA (Red Hat Certified System Administrator OpenStack), *Red Hat*

[2017] CITO (Certified IT Operator), *EXIN*

[2015] CEH (Certified Ethical Hacker), *EC-Council*

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Employment Record :

- (2019 – Present) Lab. CNP (Cloud & Node Platform) – Telkom DDS
  - Research Assistant (2019 – Present)
- (2018) Telkom DDS - Student Internship Program
  - Lab CNP-IRS Telkom DDS Intern (2019)

Education :

Bachelor of Engineering (B.Eng.), Telecommunication Engineering [2015 – 2019]

Certification :

[2019] CCNA (Cisco Certified Network Associate-Routing & Switching), *Cisco*

[2018] Apsara Clouder - Cloud Computing Specialist Certification, *Alibaba Cloud*

[2017] CSCU V2 (Certified Secure Computer User V2), *EC-Council*

[2015] MTCNA (MikroTik Certified Network Associate), *MikroTik*

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Outline

1. Overview

A brief overview of NFV; Network acceleration technology; SFC; SPP; & ATII-WP4

2. Implementation

Network topology; SFC on OVS, OVS-DPDK & SPP

3. Progress & Results

Progress & results; Working Project timeline

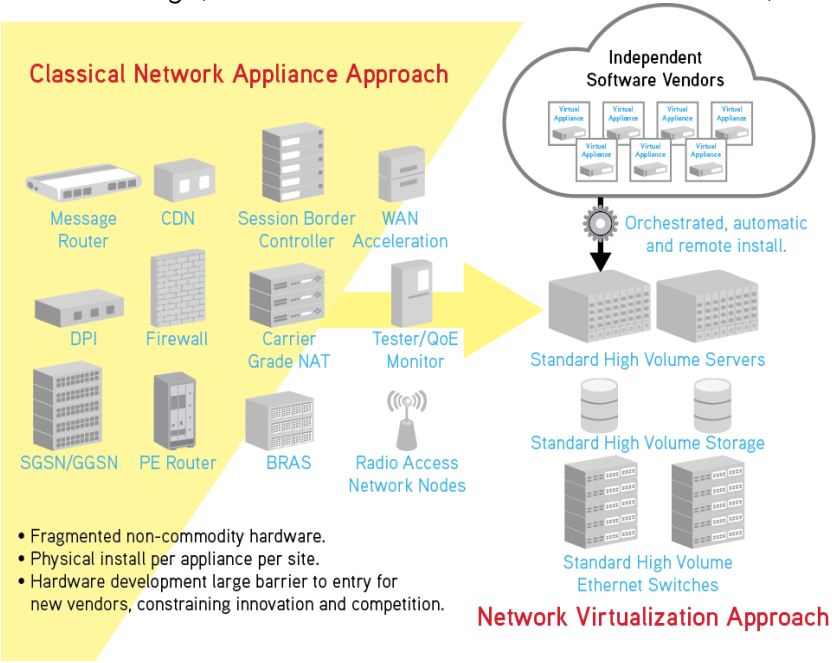
1. Overview

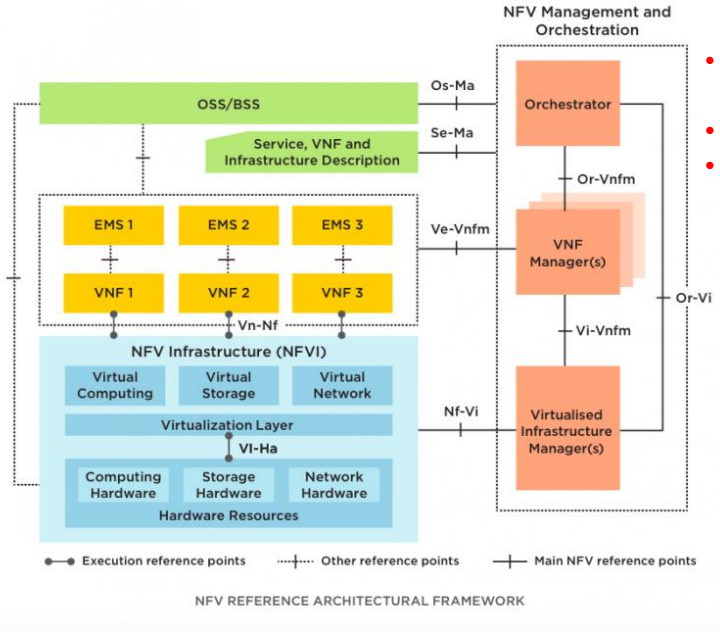
A brief overview of:

- NFV (Network Function Virtualization),
- Network acceleration technology,
- SFC (Service Function Chaining),
- SPP (Soft Patch Panel),
- ATII-WP4 (APAC Telco Innovation Initiative – Working Project 4)

NFV (Network Function Virtualization)

NFV (Network function virtualization) is a concept or principle of separating network functions from the hardware they run on by using virtual hardware abstraction. This aims to transform the way that network operators architect networks by evolving standard IT virtualisation technology to consolidate many network equipment types onto industry standard high volume servers, switches and storage, which could be located in Datacentres, Network Nodes and in the end user premises.

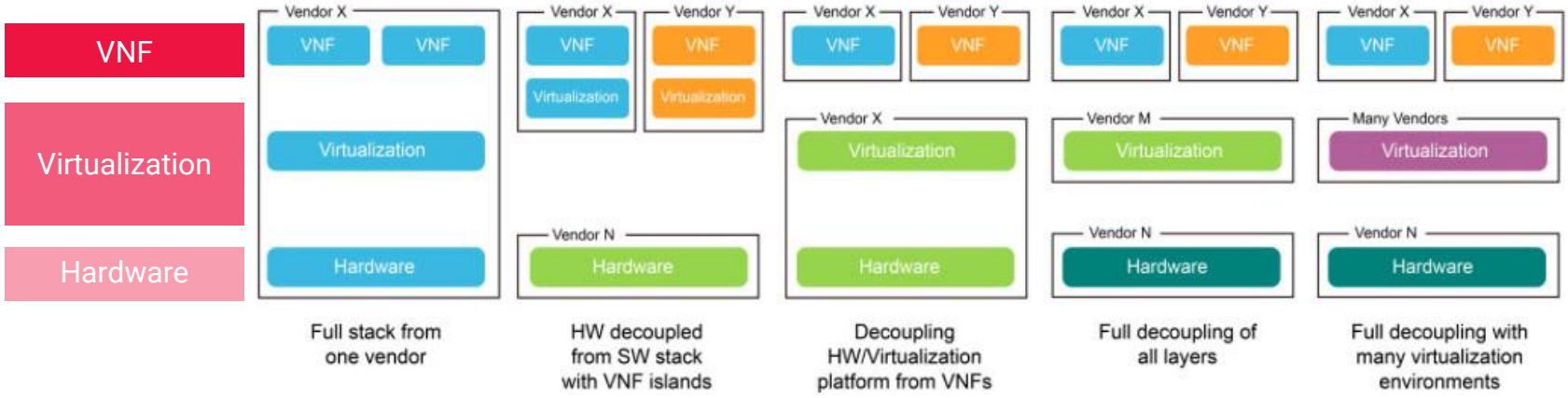




- NFVI: Network Fuction Virtualization Infrastructure
- VNF: Virtualized Network Function
- NFV-MANO: NFV Management & Orchestration

source: ETSI

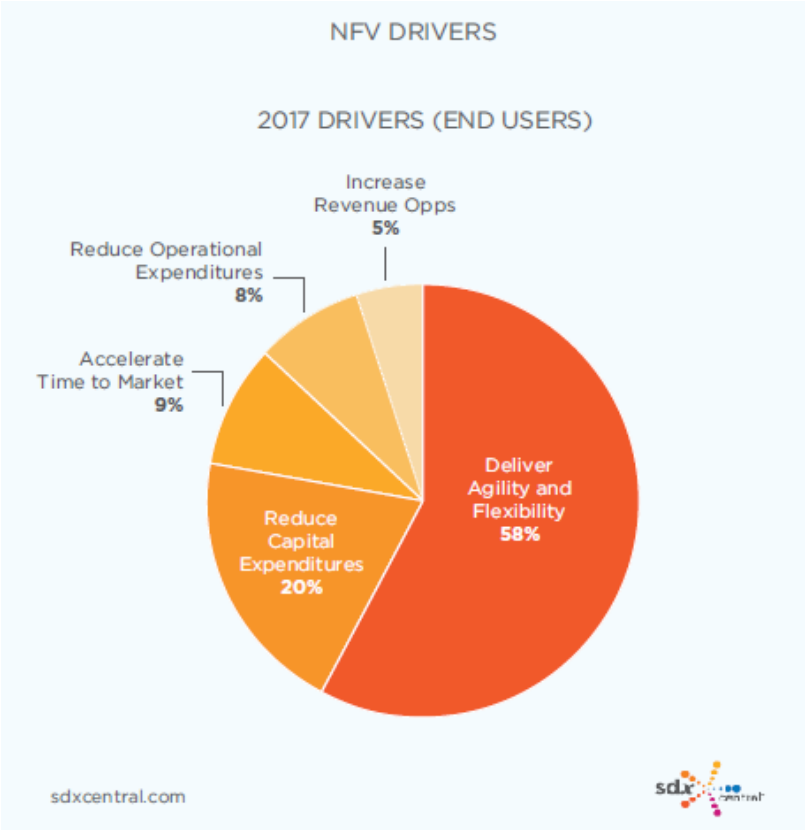
NFV Deployment Model

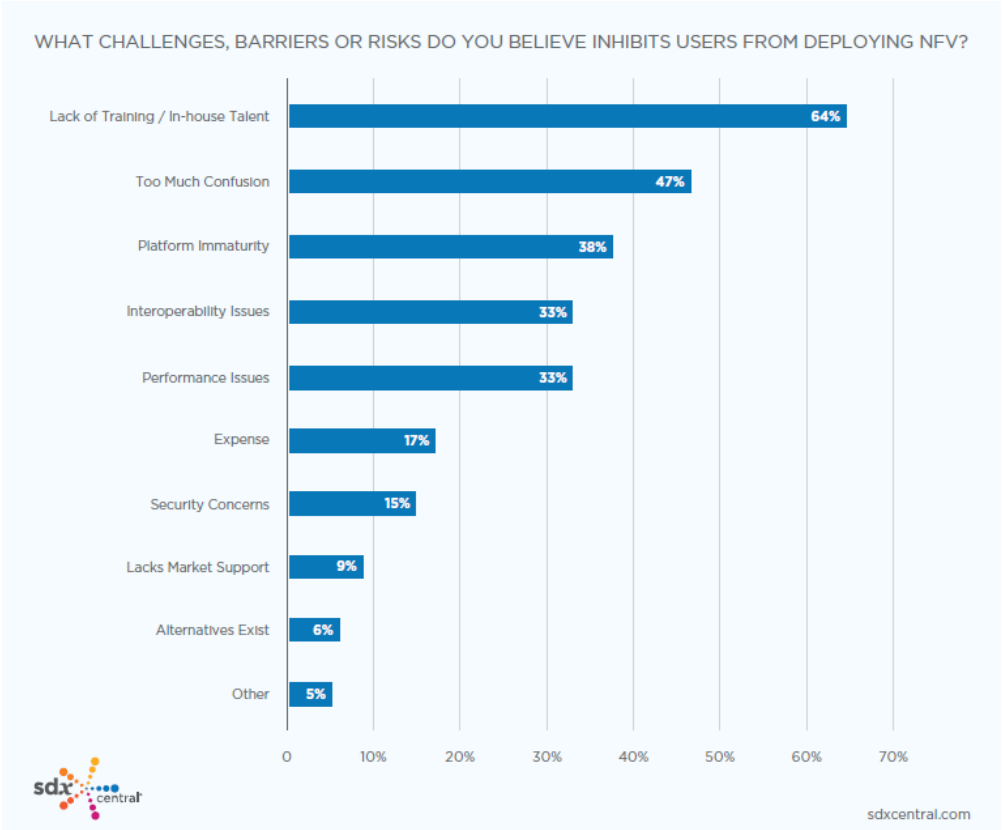


					TCO & Risk
SI Costs	Lowest	Low	Medium	High	Highest
Functionality & Perf	Deterministic	Largely Deterministic	Partially Deterministic	Non Deterministic	Non Deterministic
Ops Complexity	Lowest	Low - Medium	Medium	High	High
Lifecycle Management	Lowest	Medium	Medium	High	Highest
Flexibility	Low	High	Medium	High	Highest
TCO	Lowest	Low	Medium	High	Highest

source: materi NFV Cisco & Ericsson

NFV Driver & Challenges





source: sdxcentral

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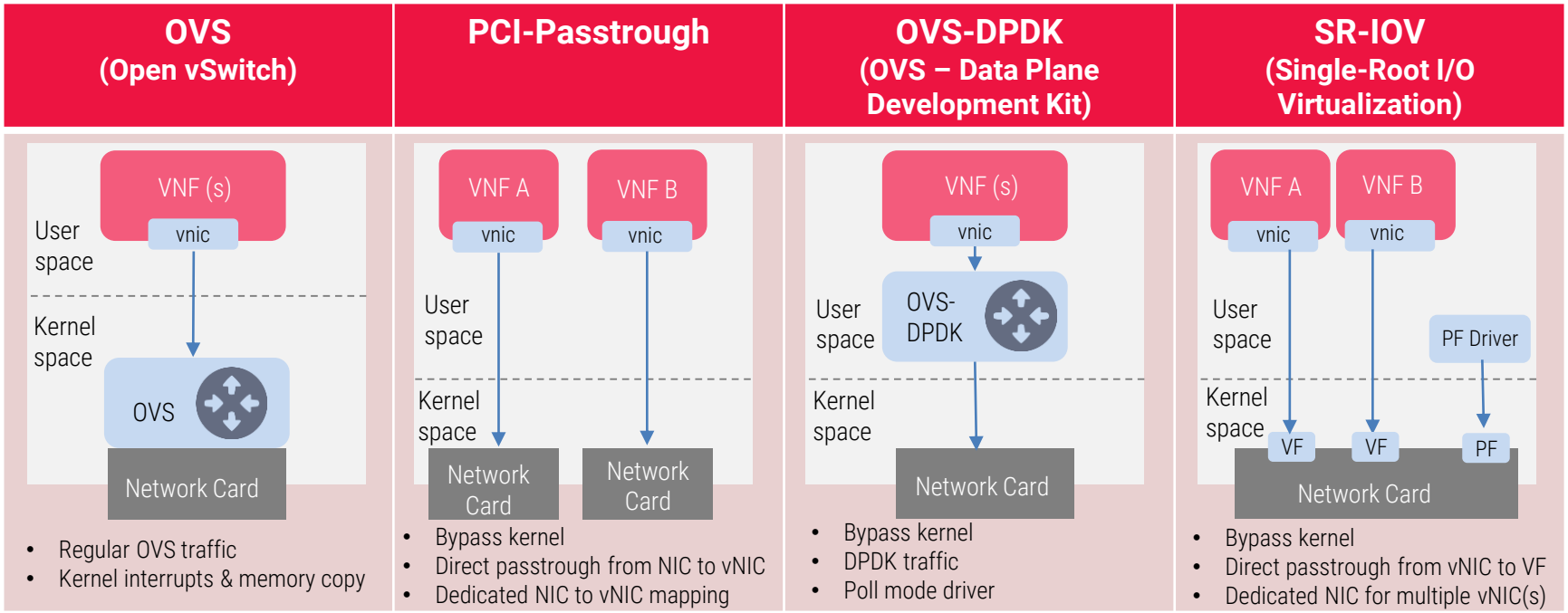
Network Acceleration Technology

vSwitch

DHA (Direct Hardware Access)



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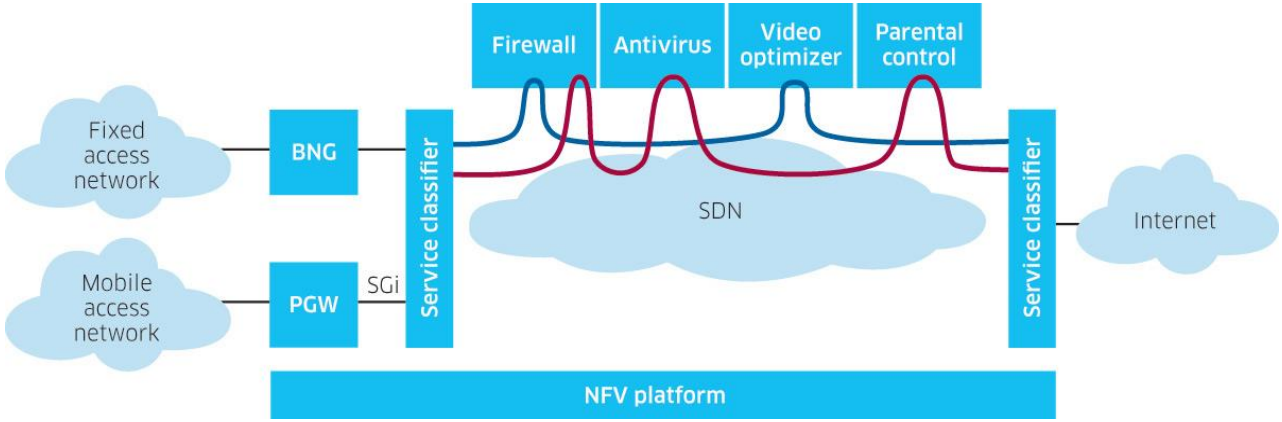
SFC (Service Function Chaining)

Network service chaining, also known as service function chaining (SFC) is a capability that uses software-defined networking (SDN) capabilities to create a service chain of connected network services (such as L4-7 like firewalls, network address translation [NAT], intrusion protection) and connects them in a virtual chain.

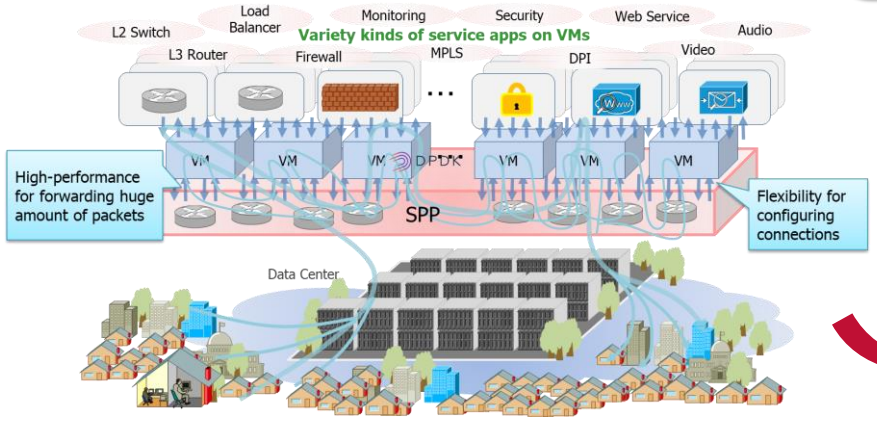


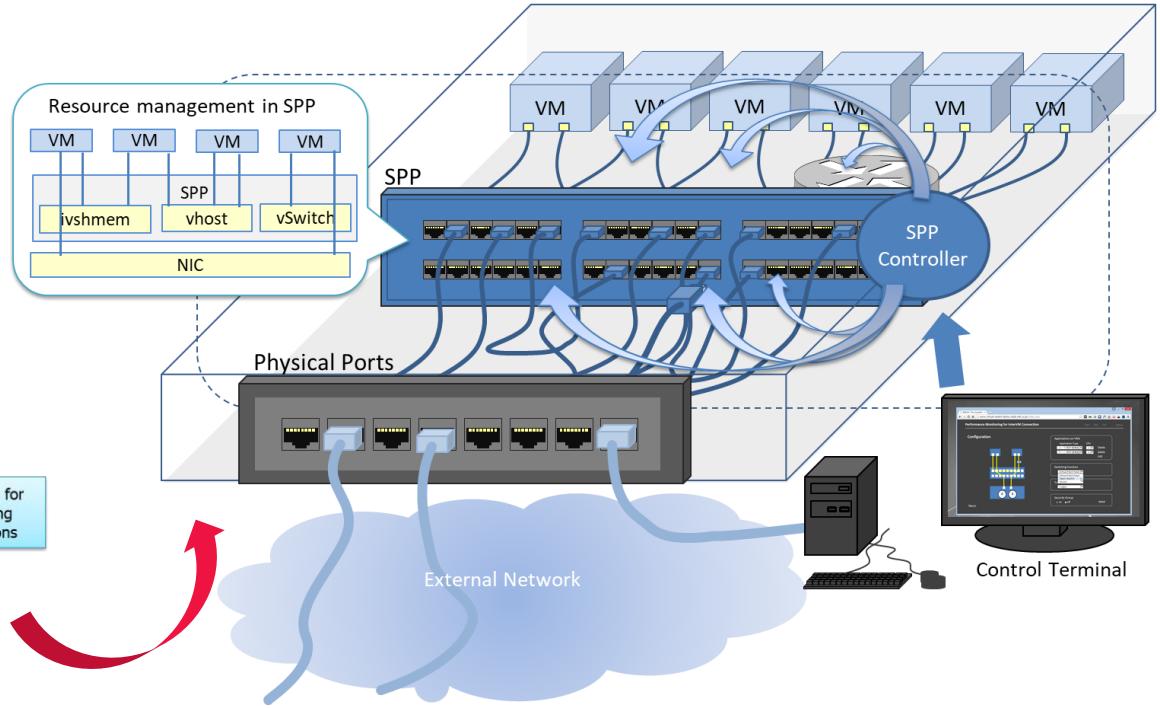
Network service chaining capabilities mean that a large number of virtual network functions can be connected together in an NFV environment. Because it's done in software using virtual circuits, these connections can be set up and torn down as needed with service chain provisioning through the NFV orchestration layer.

source: sdxcentral

SPP (Soft Patch Panel)

- Flexibility of configuration and Performance of processing are the key requirements for virtual switching function for service chaining. It's difficult to satisfy both of them.
- SPP(Soft Patch Panel) is a new technology to meet both of requirements with Intel DPDK.



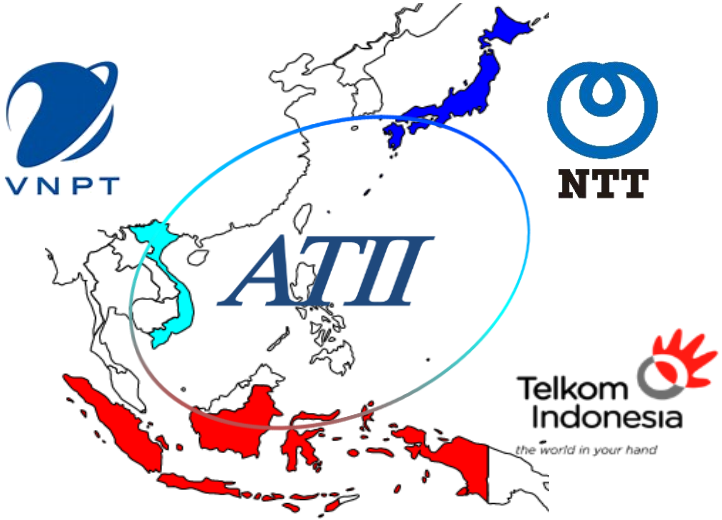


source: NTT, ATII

ATII - WP4

Asia Pacific Telecommunication
Innovation Initiative

Working Project 4



- NTT and Telkom Indonesia established ATII in April 2017, to promote the creation of new network services considering social problems in the APAC region and to promote technical studies.
- ATII has extended to three operators structure with VNPT's joining.

Project	Theme	Member
WP1	High value-added network services	NTT Telkom
WP2	Server platform virtualization	Telkom NTT
WP3	Flexible access network virtualization	NTT Telkom VNPT
WP4	vSwitch for service function chaining	NTT Telkom VNPT
WP5	Ensuring the reliability of ICT equipment by reducing lightning malfunction	NTT Telkom

source: ATII

2. Implementation

- SFC research topology (virtualized internet access service use case)
- SFC implementation on OpenStack with OVS
- SFC implementation on OpenStack with OVS-DPDK
- SFC implementation on OpenStack with SPP

SFC research topology

(virtualized internet access service use case)

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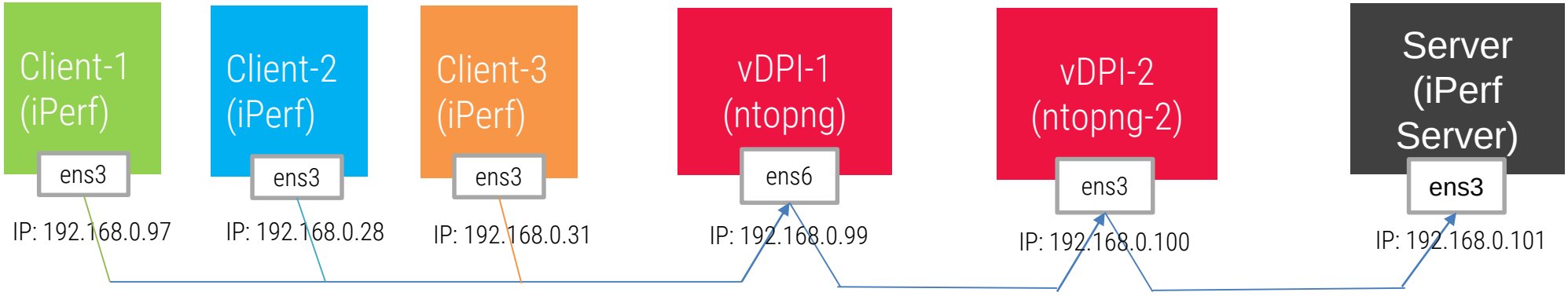

Instances/ VM in Openstack:

Instance Name	Image Name	IP Address	Flavor
client	-	192.168.0.97	m1.medium
client-2	client-sfc	192.168.0.28	m1.medium
client-3	client-sfc	192.168.0.31	m1.medium

ntopng	ntop-ubuntu18	internal-atii-1 192.168.0.99 management-atii 172.16.0.19 Floating IPs: 10.14.36.194	m1.small
ntop-2	ntop-ubuntu18	management-atii 172.16.0.34 Floating IPs: 10.14.36.195 internal-atii-1 192.168.0.100	m1.small

server	-	192.168.0.101	m1.small

client : Ubuntu Server 16.04 + LXDE, iperf, traceroute

server : Ubuntu Server 16.04, iperf, traceroute, nginx

ntopng : Ubuntu Server 18.04, ntopng

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SFC Implementation on Openstack with OVS

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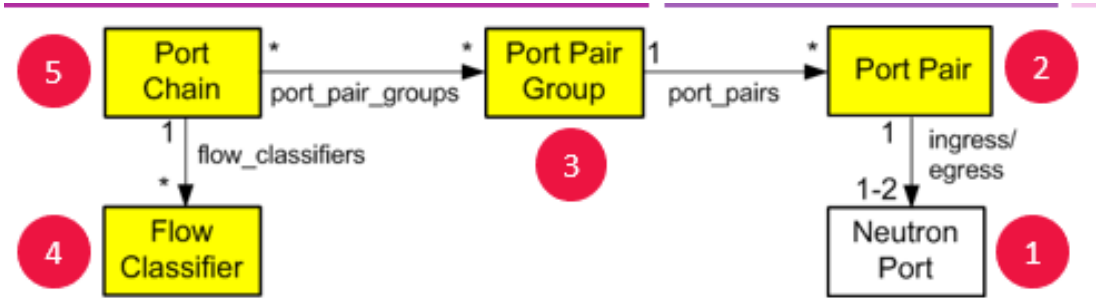
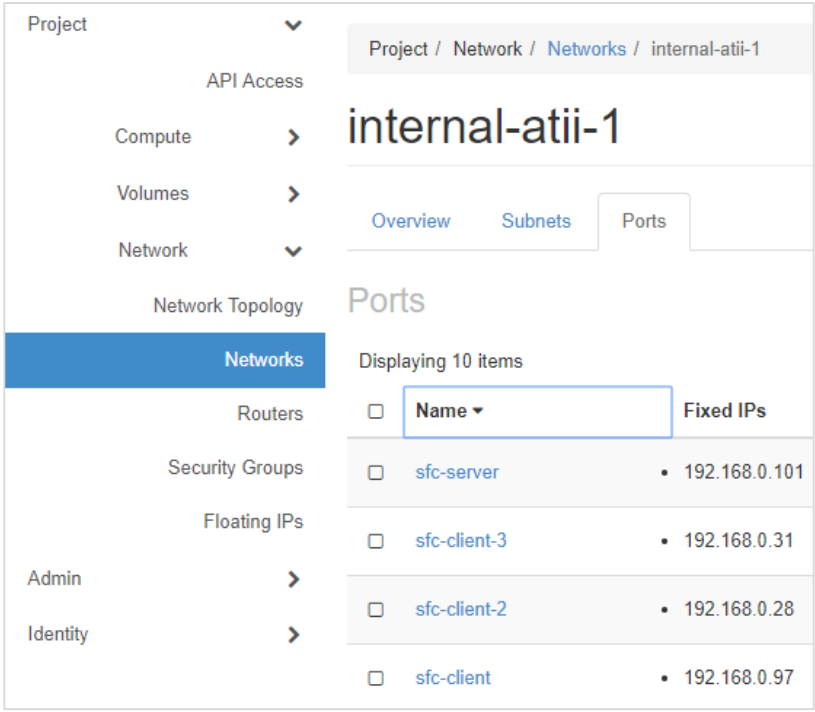


Neutron Port



Source : https://docs.openstack.org/newton/networking-guide/config-sfc.html

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SFC Implementation on Openstack with OVS (2)

SFC Instalation in Openstack - Using local.conf

enable_plugin networking-sfc <GITURL> [GITREF]

Example :

```
enable_plugin networking-sfc https://opendev.org/openstack/networking-sfc stable/queens
NETWORKING_SFC_DIR="$DEST/networking-sfc"
NEUTRON_FLOWCLASSIFIER_PLUGIN="networking_sfc.services.flowclassifier.plugin.FlowClassifierPlugin"
NEUTRON_SFC_PLUGIN="networking_sfc.services.sfc.plugin.SfcPlugin"
NEUTRON_FLOWCLASSIFIER_DRIVERS="ovs"
NEUTRON_SFC_DRIVERS="ovs"
```

Source : https://opendev.org/openstack/networking-sfc/src/branch/master/devstack

SFC Implementation on Openstack with OVS (3)

SFC Instalation in Openstack - Manual

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1. Install python-networking-sfc

First Step install python-networking-sfc, use command:

```
$ pip install -c --user https://opendev.org/openstack/requirements/raw/branch/master/upper-constraints.txt?h=stable/queens networking-sfc==6.0.0
```

Make sure the networking sfc version matches the openstack version used, for example here we use the version 6 (Queens)

2. Configure neutron.conf

Enable the service plugins in neutron-server by adding them in neutron.conf

```
$ sudo nano /etc/neutron/neutron.conf
```

add syntax flow_classifier and sfc on service_plugins

```
service_plugins = flow_classifier,sfc
```

```
[sfc]
drivers = ovs
```

```
[flowclassifier]
drivers = ovs
```

Source : https://docs.openstack.org/networking-sfc/queens/install/index.html

SFC Implementation on Openstack with OVS (4)

SFC Instalation in Openstack - Manual

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3. Configure ml2_conf.ini

enable the networking-sfc extension in the Open vSwitch agent. The configuration file name can change, the default one is /etc/neutron/plugins/ml2/ml2_conf.ini

```
[agent]
extensions = sfc
```

4. Restart and update database setup

After all done, you can run some command

```
$ systemctl restart devstack@q-svc
```

or

```
$ systemctl restart neutron-server
```

```
$ systemctl restart devstack@q-agt
```

or

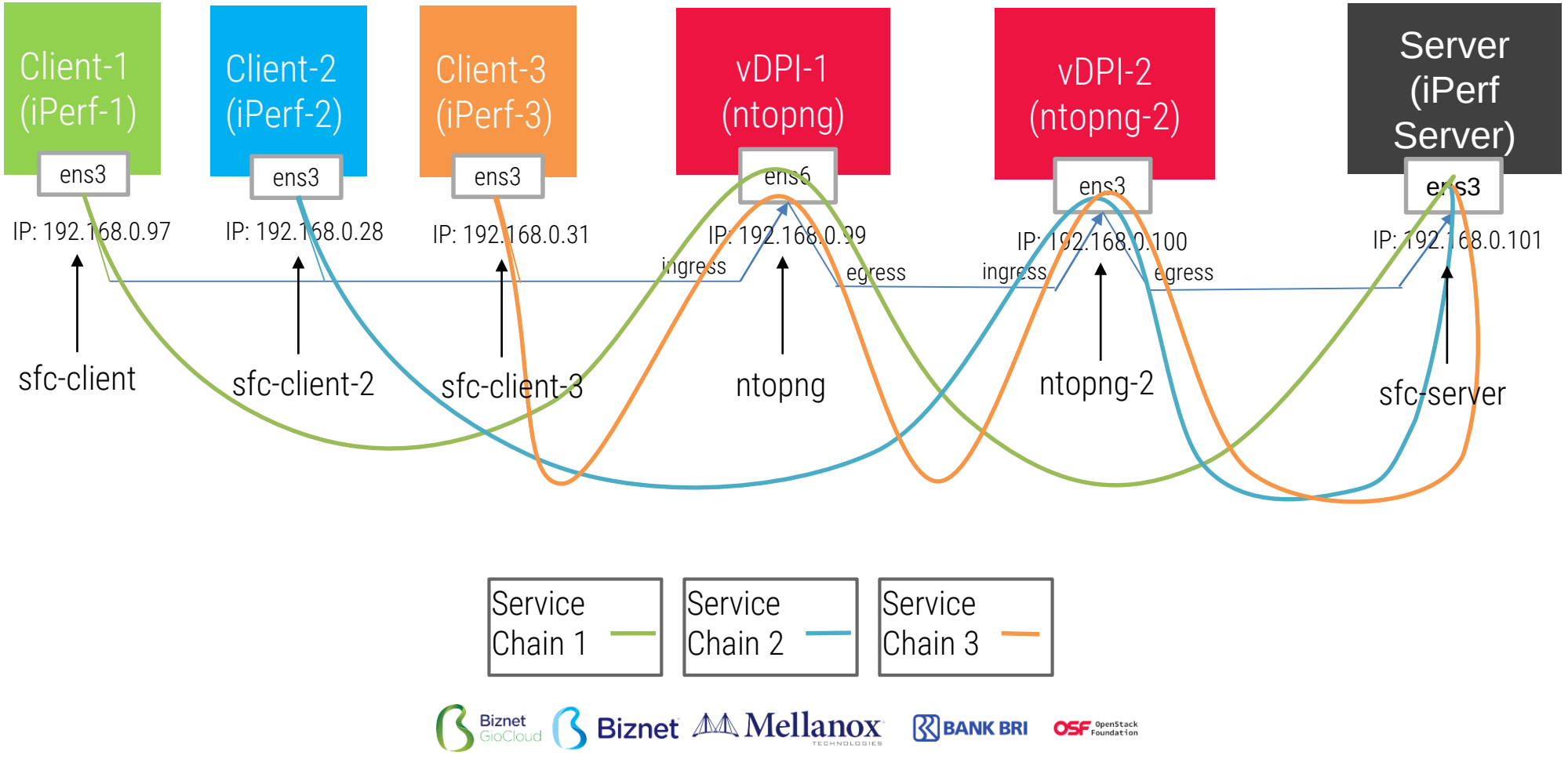
```
$ systemctl restart neutron-openvswitch-agent
```

```
$ neutron-db-manage --subproject networking-sfc upgrade head
```

Source : https://docs.openstack.org/networking-sfc/queens/install/index.html

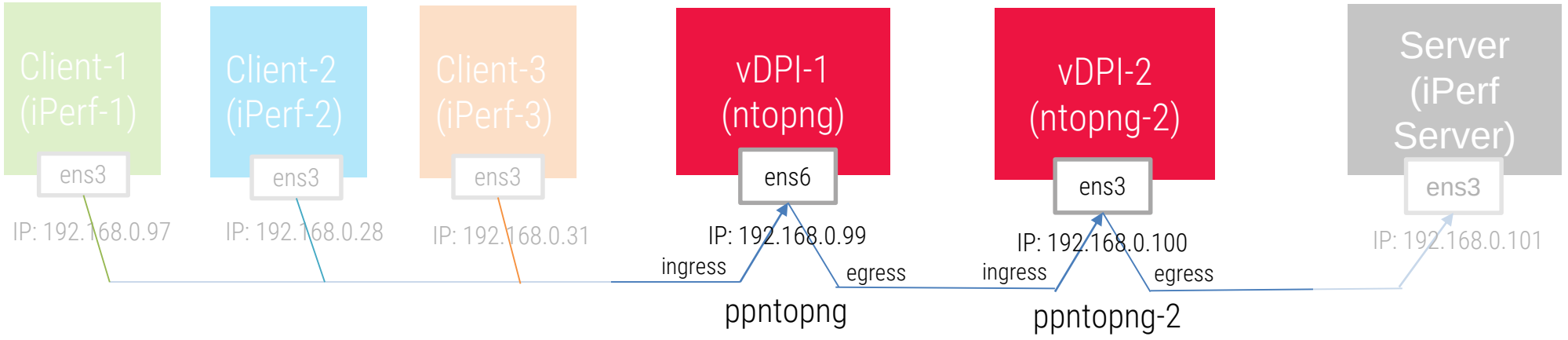
SFC Implementation on Openstack with OVS (5)

Service Chain



SFC Implementation on Openstack with OVS (6)

Create Port Pair




```
stack@stack:~$ openstack sfc port pair create \
>   --ingress ntopng \
>   --egress ntopng ppntopng
+---------------------------+--------------------------------------+
| Field                     | Value                                |
+---------------------------+--------------------------------------+
| Description               |                                      |
| Egress Logical Port       | e2edb029-96c0-4241-a791-2efc5f1b5a81 |
| ID                        | 7cf39a21-aeb7-462a-8665-c8bd6e2029f8 |
| Ingress Logical Port      | e2edb029-96c0-4241-a791-2efc5f1b5a81 |
| Name                      | ppntopng                             |
| Project                   | 9801f70ff6b546049ba423ebc2cbf881     |
| Service Function Parameters | {u'weight': 1, u'correlation': None} |
| tenant_id                 | 9801f70ff6b546049ba423ebc2cbf881     |
+---------------------------+--------------------------------------+
```

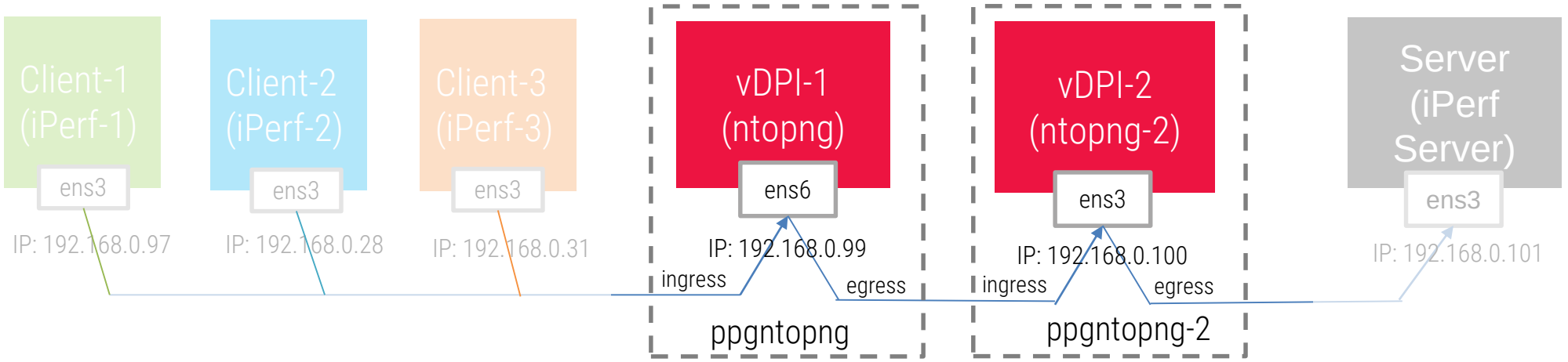
```
stack@stack:~$ openstack sfc port pair show ppntopng-2
+---------------------------+--------------------------------------+
| Field                     | Value                                |
+---------------------------+--------------------------------------+
| Description               |                                      |
| Egress Logical Port       | 278f813f-3e49-4889-9a18-bf06f83d0565 |
| ID                        | d9d8fdce-d08b-4a5e-b686-80e913e1c7fc |
| Ingress Logical Port      | 278f813f-3e49-4889-9a18-bf06f83d0565 |
| Name                      | ppntopng-2                           |
| Project                   | 9801f70ff6b546049ba423ebc2cbf881     |
| Service Function Parameters | {u'weight': 1, u'correlation': None} |
| tenant_id                 | 9801f70ff6b546049ba423ebc2cbf881     |
+---------------------------+--------------------------------------+
```

#port pair

$ openstack sfc port pair create --ingress (port) --egress (port) **name_port_pair**

SFC Implementation on Openstack with OVS (7)

Create Port Pair Group




```
stack@stack:~$ openstack sfc port pair group create \
>   --port-pair ppntopng ppgntopng
+-------------------------+--------------------------------------------------------------------------------------------------------+
| Field                   | Value                                                                                                  |
+-------------------------+--------------------------------------------------------------------------------------------------------+
| Description             |                                                                                                        |
| ID                      | cddccec2-6f1f-4fb4-ac15-f09cda66580a                                                                   |
| Loadbalance ID          | 1                                                                                                      |
| Name                    | ppgntopng                                                                                              |
| Port Pair               | [u'7cf39a21-aeb7-462a-8665-c8bd6e2029f8']                                                              |
| Port Pair Group Parameters | {u'lb_fields': [], u'ppg_n_tuple_mapping': {u'ingress_n_tuple': {}, u'egress_n_tuple': {}}}          |
| Project                 | 9801f70ff6b546049ba423ebc2cbf881                                                                       |
| Tap Enabled             | False                                                                                                  |
| tenant_id               | 9801f70ff6b546049ba423ebc2cbf881                                                                       |
+-------------------------+--------------------------------------------------------------------------------------------------------+
```

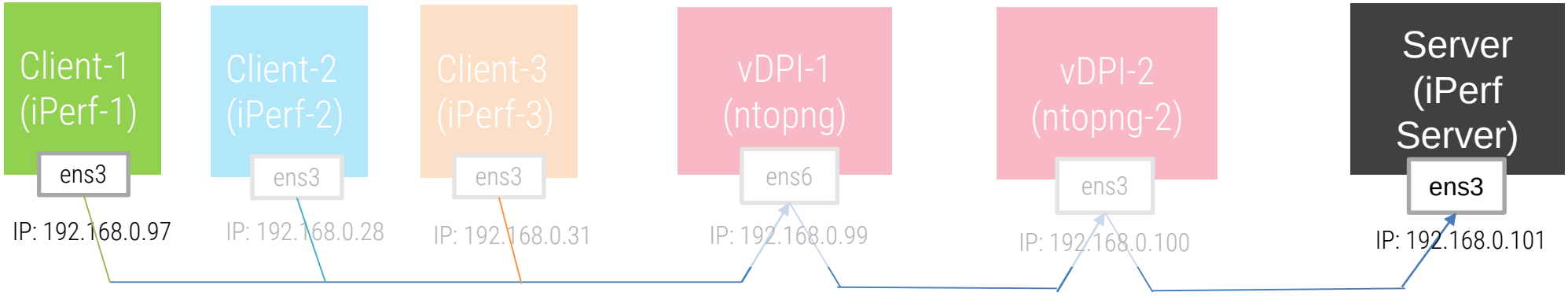
```
stack@stack:~$ openstack sfc port pair group show ppgntopng-2
+-------------------------+--------------------------------------------------------------------------------------------------------+
| Field                   | Value                                                                                                  |
+-------------------------+--------------------------------------------------------------------------------------------------------+
| Description             |                                                                                                        |
| ID                      | 18603cb2-bfdd-4fc2-a60f-61a74444837e                                                                   |
| Loadbalance ID          | 2                                                                                                      |
| Name                    | ppgntopng-2                                                                                            |
| Port Pair               | [u'd9d8fdce-d08b-4a5e-b686-80e913e1c7fc']                                                              |
| Port Pair Group Parameters | {u'lb_fields': [], u'ppg_n_tuple_mapping': {u'ingress_n_tuple': {}, u'egress_n_tuple': {}}}          |
| Project                 | 9801f70ff6b546049ba423ebc2cbf881                                                                       |
| Tap Enabled             | False                                                                                                  |
| tenant_id               | 9801f70ff6b546049ba423ebc2cbf881                                                                       |
+-------------------------+--------------------------------------------------------------------------------------------------------+
```

#port pair group

$ openstack sfc port pair group create --port-pair (port_pair_1) --port-pair (port_pair_n) **name_port_pair_group**

SFC Implementation on Openstack with OVS (8)

Create Flow Classifier for Service Chain 1



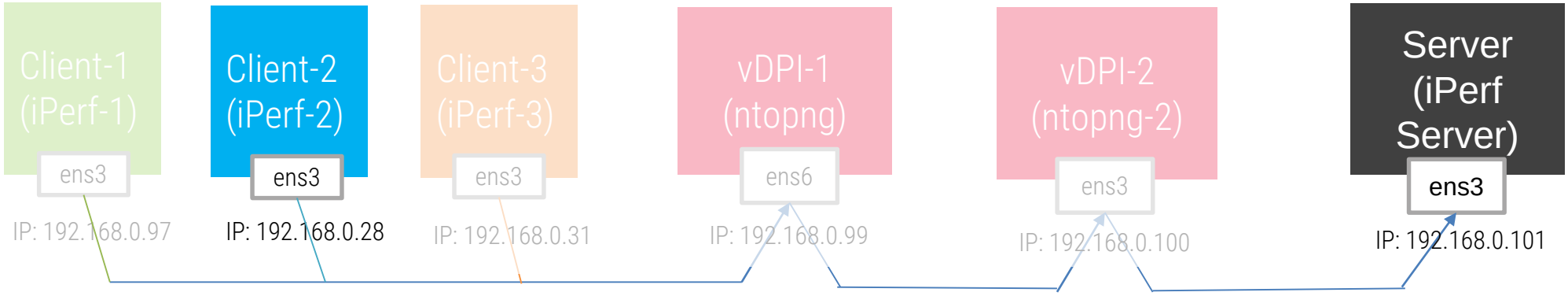

```
stack@stack:~$ openstack sfc flow classifier show fcntopng
+----------------------------+--------------------------------------+
| Field                      | Value                                |
+----------------------------+--------------------------------------+
| Description                |                                      |
| Destination IP             | 192.168.0.101/32                     |
| Destination Port Range Max | None                                 |
| Destination Port Range Min | None                                 |
| Ethertype                  | IPv4                                 |
| ID                         | 312c58e6-43e4-45f6-aaab-a9f4d62d7809 |
| L7 Parameters              | {}                                   |
| Logical Destination Port   | 6efee653-866d-49d8-b59e-aef555f1c967 |
| Logical Source Port        | 523fa75c-52be-4be8-bb6f-f1af01b6c6e7 |
| Name                       | fcntopng                             |
| Project                    | 9801f70ff6b546049ba423ebc2cbf881     |
| Protocol                   | None                                 |
| Source IP                  | 192.168.0.97/32                      |
| Source Port Range Max      | None                                 |
| Source Port Range Min      | None                                 |
| tenant_id                  | 9801f70ff6b546049ba423ebc2cbf881     |
+----------------------------+--------------------------------------+
```

#flow classifier

$ openstack sfc flow classifier create --ethertype IPv4 --source-ip-prefix 192.168.0.97/32 --destination-ip-prefix 192.168.0.101/32 --logical-source-port sfc-client --logical-destination-port sfc-server **fcntopng**

SFC Implementation on Openstack with OVS (9)

Create Flow Classifier for Service Chain 2



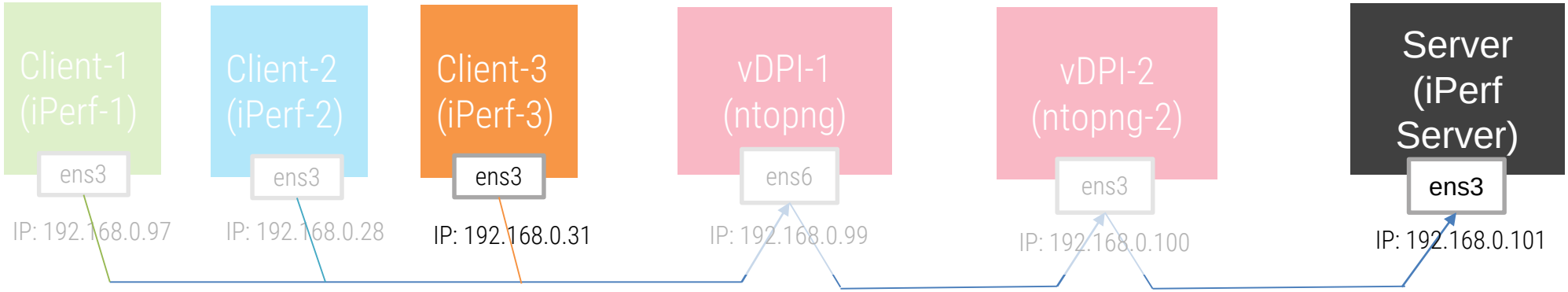

```
stack@stack:~$ openstack sfc flow classifier show fcntopng-2
+----------------------------+--------------------------------------+
| Field                      | Value                                |
+----------------------------+--------------------------------------+
| Description                |                                      |
| Destination IP             | 192.168.0.101/32                     |
| Destination Port Range Max | None                                 |
| Destination Port Range Min | None                                 |
| Ethertype                  | IPv4                                 |
| ID                         | 99b792fd-6d91-4caf-a8c0-25e2be78c01c |
| L7 Parameters              | {}                                   |
| Logical Destination Port   | 6efee653-866d-49d8-b59e-aef555f1c967 |
| Logical Source Port        | 7ca5395f-0aad-43fd-b7a4-61a6516a96f0 |
| Name                       | fcntopng-2                           |
| Project                    | 9801f70ff6b546049ba423ebc2cbf881     |
| Protocol                   | None                                 |
| Source IP                  | 192.168.0.28/32                      |
| Source Port Range Max      | None                                 |
| Source Port Range Min      | None                                 |
| tenant_id                  | 9801f70ff6b546049ba423ebc2cbf881     |
+----------------------------+--------------------------------------+
```

#flow classifier

$ openstack sfc flow classifier create --ethertype IPv4 --source-ip-prefix 192.168.0.97/32 --destination-ip-prefix 192.168.0.101/32 --logical-source-port sfc-client-2 --logical-destination-port sfc-server **fcntopng-2**

SFC Implementation on Openstack with OVS (10)

Create Flow Classifier for Service Chain 3



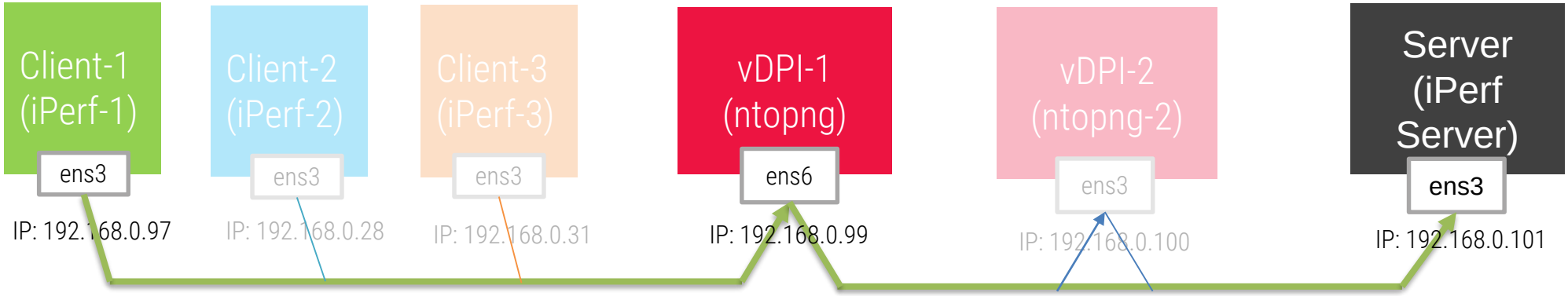

```
stack@stack:~$ openstack sfc flow classifier show fcntopng-3
+----------------------------+--------------------------------------+
| Field                      | Value                                |
+----------------------------+--------------------------------------+
| Description                |                                      |
| Destination IP             | 192.168.0.101/32                     |
| Destination Port Range Max | None                                 |
| Destination Port Range Min | None                                 |
| Ethertype                  | IPv4                                 |
| ID                         | b854659d-a6a6-4e50-8dae-6c12c1032d60 |
| L7 Parameters              | {}                                   |
| Logical Destination Port   | 6efee653-866d-49d8-b59e-aef555f1c967 |
| Logical Source Port        | 1ebba0c8-3cf1-4743-a369-009451a9911e |
| Name                       | fcntopng-3                           |
| Project                    | 9801f70ff6b546049ba423ebc2cbf881     |
| Protocol                   | None                                 |
| Source IP                  | 192.168.0.31/32                      |
| Source Port Range Max      | None                                 |
| Source Port Range Min      | None                                 |
| tenant_id                  | 9801f70ff6b546049ba423ebc2cbf881     |
+----------------------------+--------------------------------------+
```

#flow classifier

$ openstack sfc flow classifier create --ethertype IPv4 --source-ip-prefix 192.168.0.97/32 --destination-ip-prefix 192.168.0.101/32 --logical-source-port sfc-client-3 --logical-destination-port sfc-server **fcntopng-3**

SFC Implementation on Openstack with OVS (11)

Create Port Chain for Service Chain 1




```
stack@stack:~$ openstack sfc port chain show pcntopng
+-----------------+--------------------------------------------------+
| Field           | Value                                            |
+-----------------+--------------------------------------------------+
| Chain ID        | 2                                                |
| Chain Parameters| {u'symmetric': False, u'correlation': u'mpls'}   |
| Description     |                                                  |
| Flow Classifiers| [u'312c58e6-43e4-45f6-aaab-a9f4d62d7809']        |
| ID              | bfa96418-9cc3-4869-ad51-dc574f0ffb6f             |
| Name            | pcntopng                                         |
| Port Pair Groups| [u'56353e5d-090f-4cda-9c98-ce4698a3f558']        |
| Project         | 9801f70ff6b546049ba423ebc2cbf881                 |
| tenant_id       | 9801f70ff6b546049ba423ebc2cbf881                 |
+-----------------+--------------------------------------------------+
```

#port chaining

$ openstack sfc port chain create --port-pair-group ppgntopng --flow-classifier fcntopng **pcntopng**

SFC Implementation on Openstack with OVS (12)

Create Port Chain for Service Chain 2

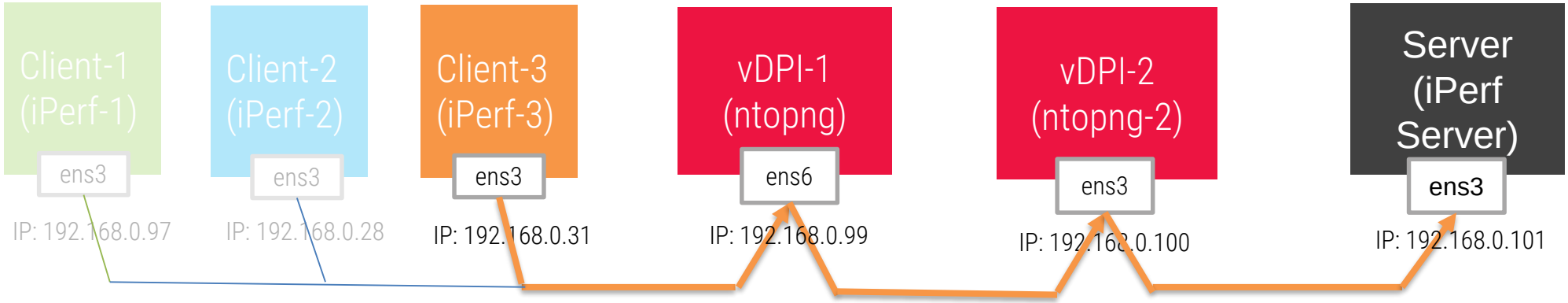

```
stack@stack:~$ openstack sfc port chain show pcntopng-2
+-----------------+--------------------------------------------------+
| Field           | Value                                            |
+-----------------+--------------------------------------------------+
| Chain ID        | 1                                                |
| Chain Parameters| {u'symmetric': False, u'correlation': u'mpls'}   |
| Description     |                                                  |
| Flow Classifiers| [u'99b792fd-6d91-4caf-a8c0-25e2be78c01c']        |
| ID              | 0b823ab2-1b93-40d7-981f-3be8b86d96a9             |
| Name            | pcntopng-2                                       |
| Port Pair Groups| [u'18603cb2-bfdd-4fc2-a60f-61a74444837e']        |
| Project         | 9801f70ff6b546049ba423ebc2cbf881                 |
| tenant_id       | 9801f70ff6b546049ba423ebc2cbf881                 |
+-----------------+--------------------------------------------------+
```

#port chaining

$ openstack sfc port chain create --port-pair-group ppgntopng-2 --flow-classifier fcntopng **pcntopng-2**

SFC Implementation on Openstack with OVS (13)

Create Port Chain for Service Chain 3




```
stack@stack:~$ openstack sfc port chain show pcntopng-3
+-----------------+--------------------------------------------------------------------------------------+
| Field           | Value                                                                                |
+-----------------+--------------------------------------------------------------------------------------+
| Chain ID        | 3                                                                                    |
| Chain Parameters | {u'symmetric': False, u'correlation': u'mpls'}                                      |
| Description     |                                                                                      |
| Flow Classifiers | [u'b854659d-a6a6-4e50-8dae-6c12c1032d60']                                           |
| ID              | 705ceffd-bace-448b-afbe-76c397b3a697                                                 |
| Name            | pcntopng-3                                                                           |
| Port Pair Groups | [u'56353e5d-090f-4cda-9c98-ce4698a3f558', u'18603cb2-bfdd-4fc2-a60f-61a74444837e'] |
| Project         | 9801f70ff6b546049ba423ebc2cbf881                                                     |
| tenant_id       | 9801f70ff6b546049ba423ebc2cbf881                                                     |
+-----------------+--------------------------------------------------------------------------------------+
```

#port chaining

$ openstack sfc port chain create --port-pair-group ppgntopng --port-pair-group ppgntopng-2 --flow-classifier fcntopng **pcntopng-3**

vDPI Setup

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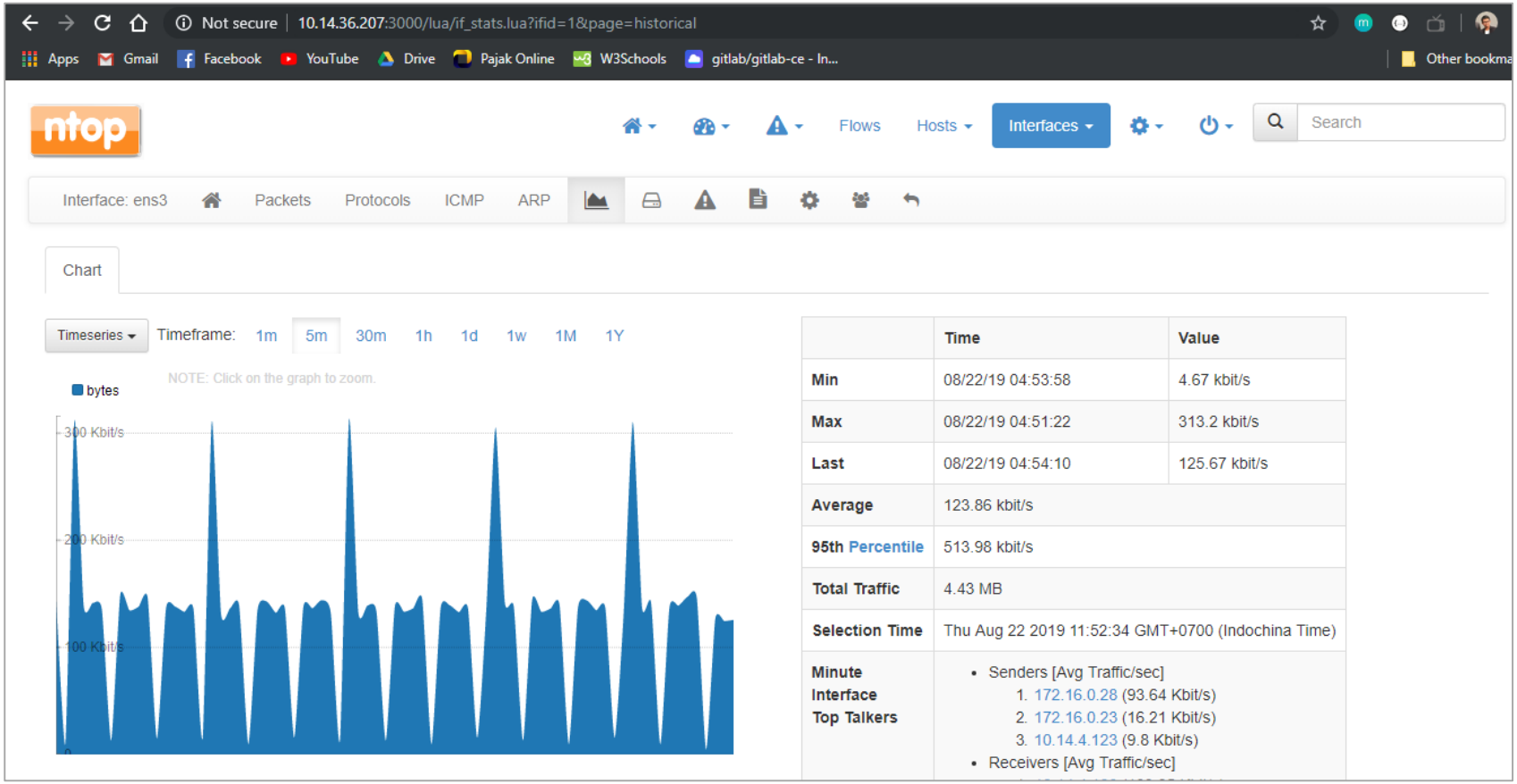

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SFC Implementation on Openstack with OVS-DPDK

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- Opendev respository ovs-dpdk

https://opendev.org/x/networking-ovs-dpdk

- Installation :

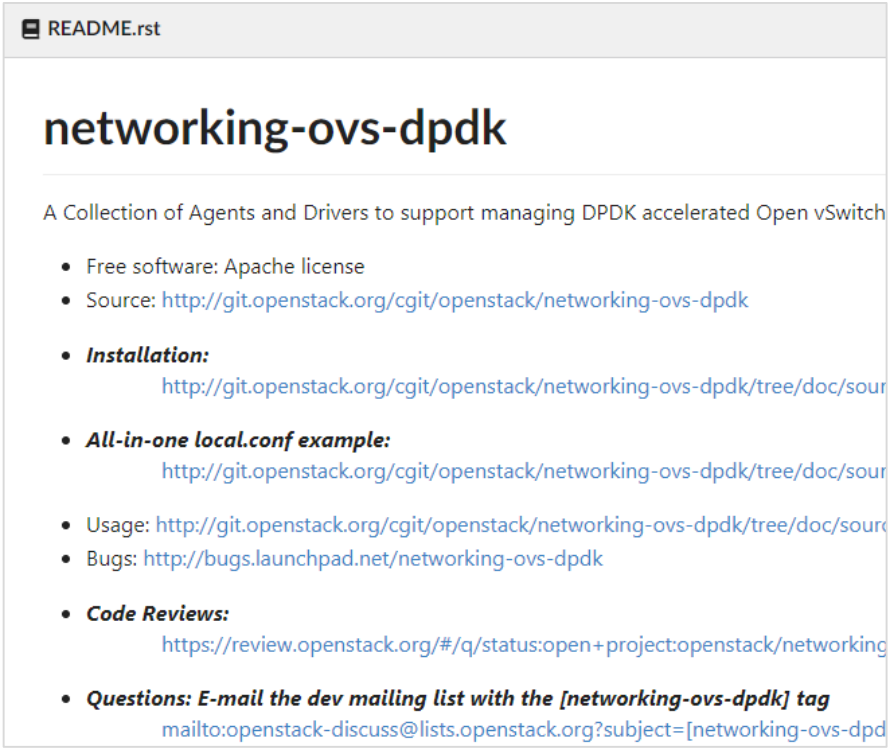
https://opendev.org/x/networking-ovs-dpdk/src/branch/master/doc/source/installation.rst

- Sample local.conf for deployment :

https://opendev.org/x/networking-ovs-dpdk/src/branch/master/doc/source/_downloads/

- Getting started with Openstack and OVS-DPDK using Ubuntu :

https://opendev.org/x/networking-ovs-dpdk/src/branch/master/doc/source/getstarted/devstack/ubuntu.rst



README.rst

networking-ovs-dpdk

A Collection of Agents and Drivers to support managing DPDK accelerated Open vSwitch

- Free software: Apache license
- Source: http://git.openstack.org/cgit/openstack/networking-ovs-dpdk
- ***Installation:***
  http://git.openstack.org/cgit/openstack/networking-ovs-dpdk/tree/doc/sour
- ***All-in-one local.conf example:***
  http://git.openstack.org/cgit/openstack/networking-ovs-dpdk/tree/doc/sour
- Usage: http://git.openstack.org/cgit/openstack/networking-ovs-dpdk/tree/doc/sour
- Bugs: http://bugs.launchpad.net/networking-ovs-dpdk
- ***Code Reviews:***
  https://review.openstack.org/#/q/status:open+project:openstack/networking
- ***Questions: E-mail the dev mailing list with the [networking-ovs-dpdk] tag***
  mailto:openstack-discuss@lists.openstack.org?subject=[networking-ovs-dpd

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SFC Implementation on Openstack with SPP

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- Opendev respository networking-spp : https://opendev.org/x/networking-spp
- Installation : https://opendev.org/x/networking-spp/src/branch/master/doc/source/installation.rst

README.rst

networking-spp

Neutron ML2 mechanism driver for Soft Patch Panel

This provides ML2 mechanism driver and agent which makes high speed communication using Soft Patch Panel (SPP) possible in the OpenStack environment.

- Free software: Apache license
- Source: https://github.com/openstack/networking-spp
- Bugs: https://bugs.launchpad.net/networking-spp

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3. Progress & Results

- Research progress report
- Working project timeline

Progress and Result : SFC on OVS

Target Test

1. Function Test:
   a) Traffic Flow for Service Chain 1: Client-1 → vDPI-1 → Server
   b) Traffic Flow for Service Chain 2: Client-2 → vDPI-2 → Server
   c) Traffic Flow for Service Chain 3: Client-3 → vDPI-1 → vDPI-2 → Server

2. Througput Test:
   a) Througput Test Without Service Chain : Client-1 → Server
   b) Througput Test for Service Chain 1: Client-1 → vDPI-1 → Server
   c) Througput Test for Service Chain 2: Client-2 → vDPI-2 → Server
   d) Througput Test for Service Chain 3: Client-3 → vDPI-1 → vDPI-2 → Server

Research Progress Report

Service Chain

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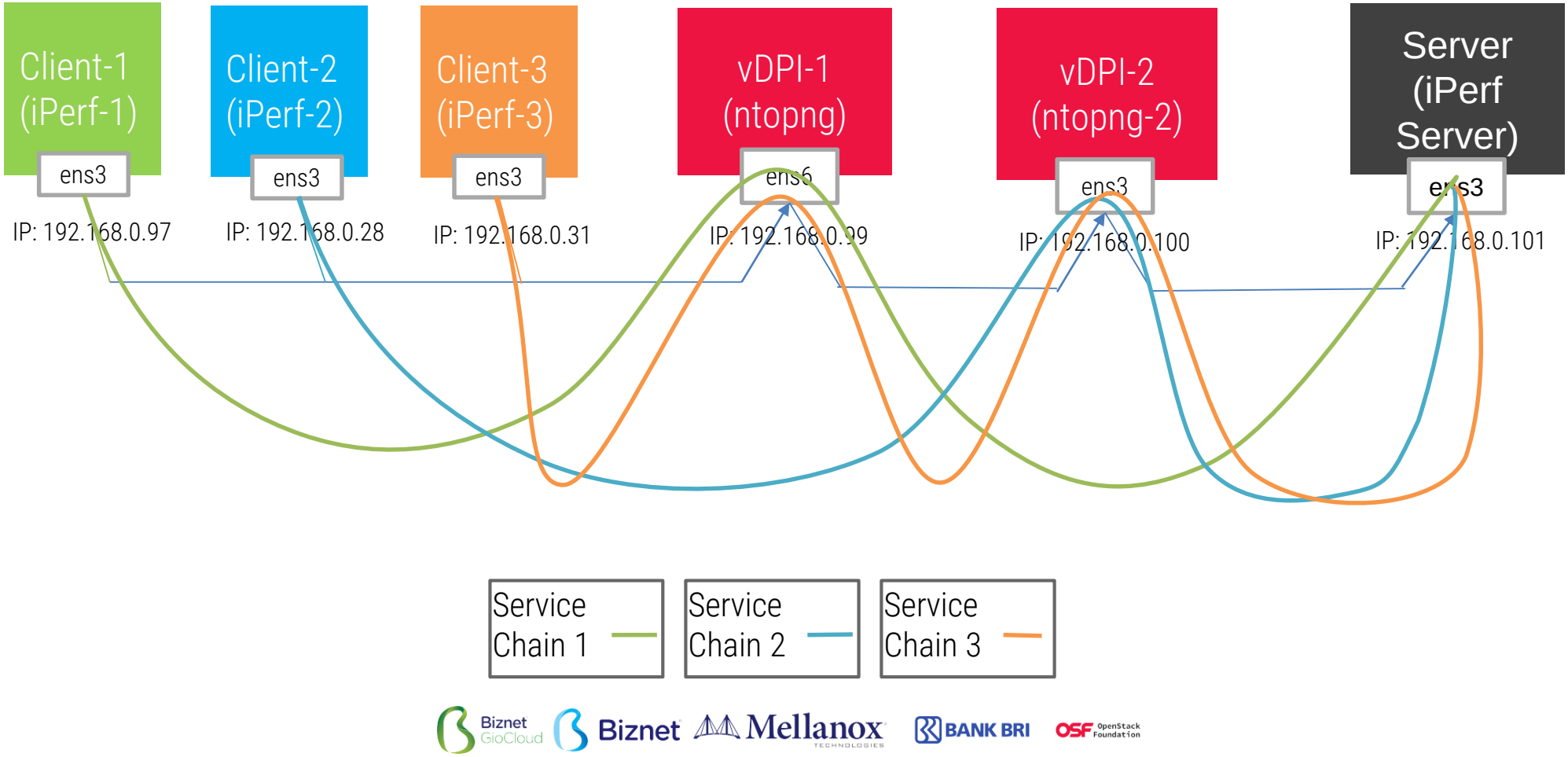

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Research Progress Report (2)

Without Service Chain

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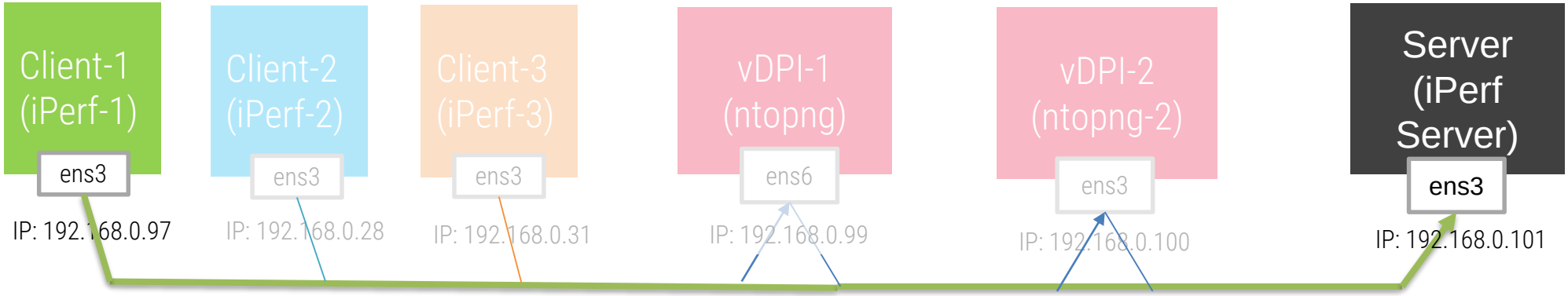


```
root@client-2:/home/client-sfc#
root@client-2:/home/client-sfc# iperf -c 192.168.0.101
------------------------------------------------------------
Client connecting to 192.168.0.101, TCP port 5001
TCP window size: 45.0 KByte (default)
------------------------------------------------------------
[  3] local 192.168.0.28 port 35370 connected with 192.168.0.101 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.0 sec  19.1 GBytes  16.4 Gbits/sec
root@client-2:/home/client-sfc#
```

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Research Progress Report (3)

Service Chain 1

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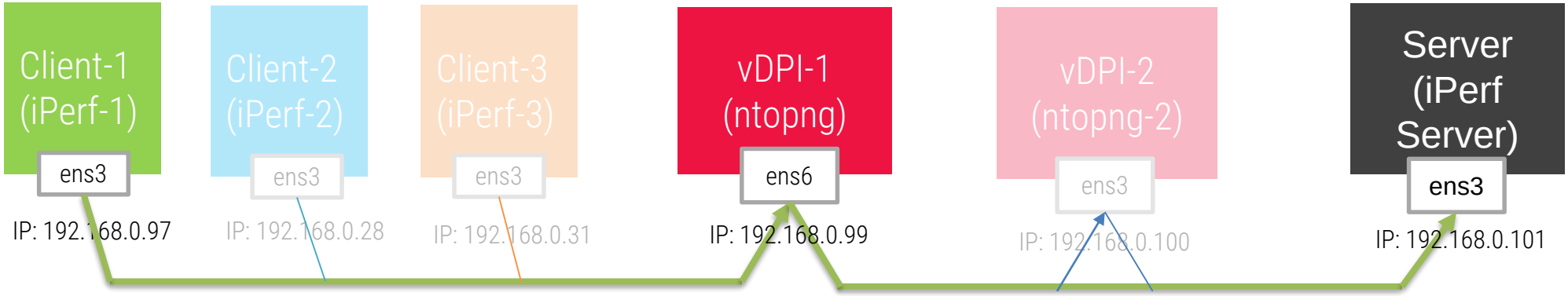

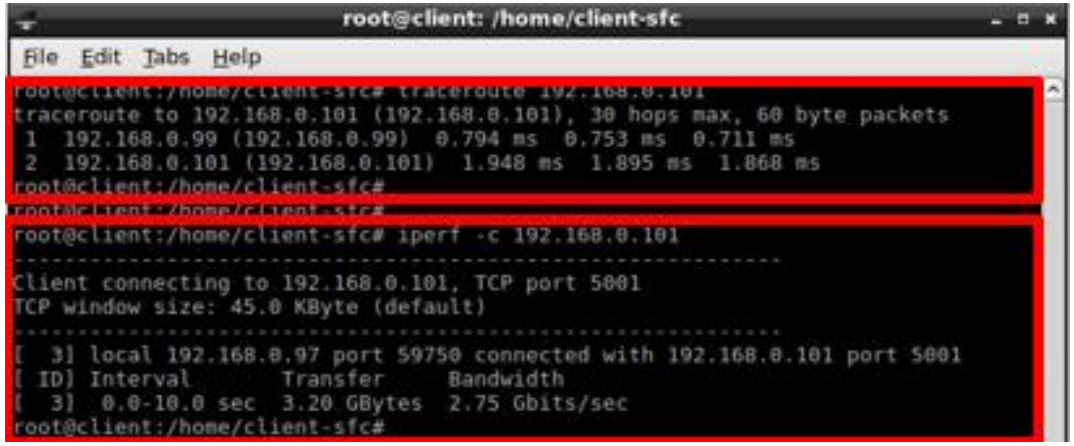

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Research Progress Report (4)

Service Chain 2

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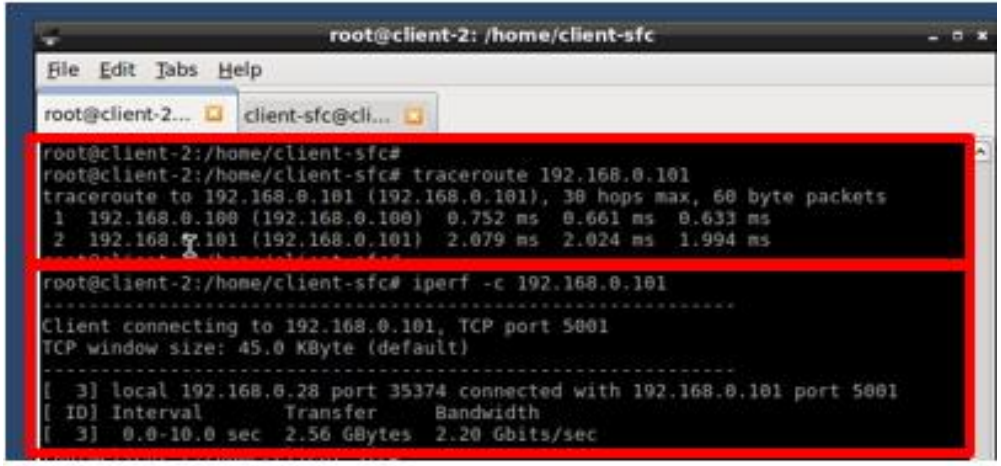

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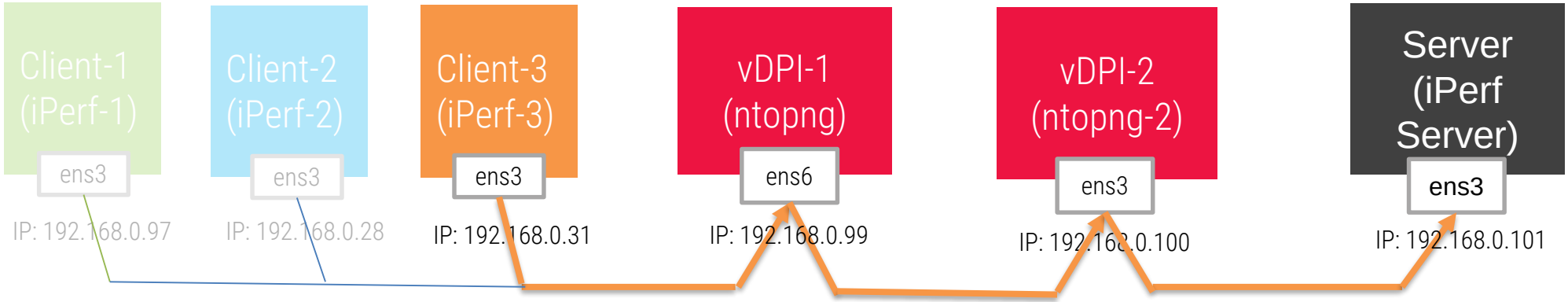
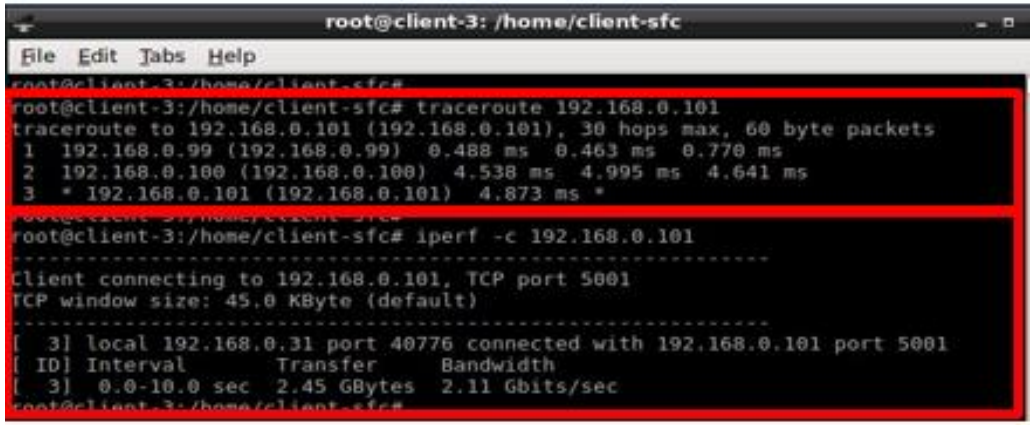
Research Progress Report (5)

Service Chain 3





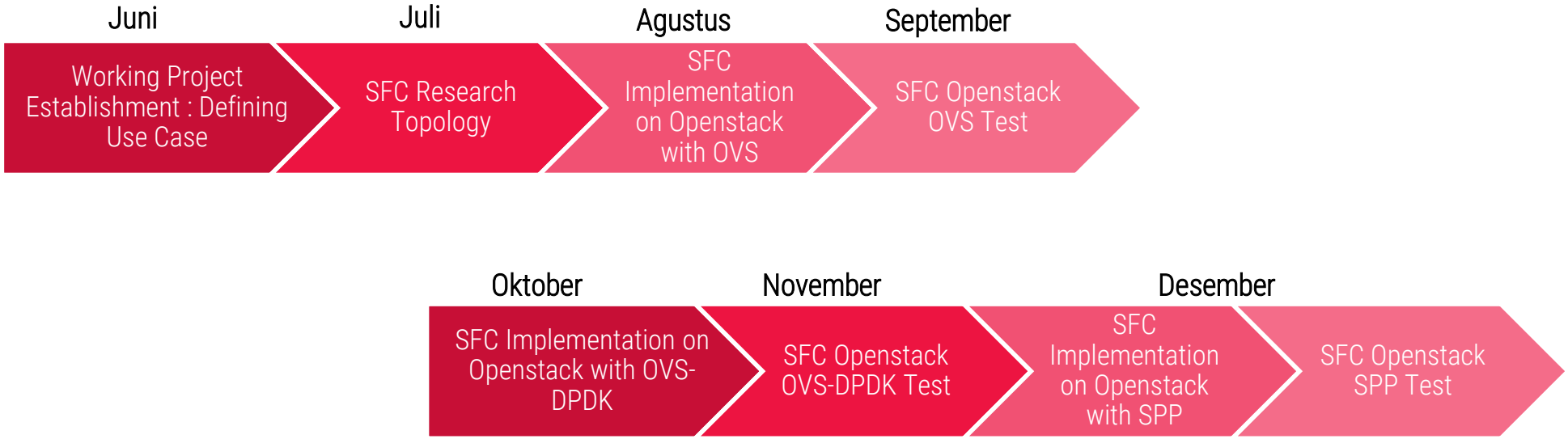
Conclusion : SFC on OvS

Result

1. Function Test:
   a) Traffic Flow for Service Chain 1: Client-1 → vDPI-1 → Server = OK
   b) Traffic Flow for Service Chain 2: Client-2 → vDPI-2 → Server = OK
   c) Traffic Flow for Service Chain 3: Client-3 → vDPI-1 → vDPI-2 → Server = OK

2. Througput Test:
   a) Througput Test Without Service Chain : Client-1 → Server = 16,4 Gbps
   b) Througput Test for Service Chain 1: Client-1 → vDPI-1 → Server = 2,75 Gbps
   c) Througput Test for Service Chain 2: Client-2 → vDPI-2 → Server = 2,20 Gbps
   d) Througput Test for Service Chain 3: Client-3 → vDPI-1 → vDPI-2 → Server = 2,11 Gbps

Working Project Timeline



source: ATII –WP4

vSwitch & Network Acceleration Comparison

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		SR-IOV	OVS	OVS-DPDK	SPP
Speed	Speed for packet processing	Good	Poor	OK	Good 10 Gbps to 12 Gbps or more
Flexibility	Hardware limitation	OK NIC limited	Good	Good DPDK is now common	Good DPDK is now common
	Live migration	Poor	Good	OK	OK (not yet verified)
Operability	Packet capture on host side	Poor pass through	OK duplicate: yes (less performance from 800Mbps) capture: no	OK duplicate: yes capture: no	Good duplicate: yes capture: yes (under test)

source: NTT

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Thank you!

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