OPNFV Project

Research Group, Okinawa Open Laboratory
Syuya NAKAMA
3 FEB 2017

PJ Proposal

Item	Content				Remarks
Purpose	Contribute OPNFV Test Lab for community Provide test Infrastructure for VNF (Virtual Network Function: Virtual Network Appliance) on OPNFV Promote and cooperate with community to spread OPNFV				
Goal	Provide VNF Test infrastructure on OPNFV for users Gain recognition in domestic market and Japan OPNFV User group				
Necessities	product	Unit Price	Number	subtotal	
	Server		8	0	Use existing
	Switch		2	0	Use existing
Duration	APR 2016 – MAR 2017				
Way of control	Weekly meeting, slack				
Way for information sharing	Google Docs to share design, plan, and discuss documents				
Role	PO	TORII(NEC)			
	PM	HAYASHI (NES)			
	member	NAKAMA（NES), HAYASHI(NES), KOBAYASHI (ADOC/up to MAY), Annette CHEN（III）,Eric CHANG（III）,James CHIANG（III）			

OPNFV Project

1. Development of VNF Test Infrastructure
   - Motivation
   - About VNF Test Infrastructure
   - Providing VNF Test Infrastructure
   - Demonstration
2. Community Activities
   - Join OPNFV as Associate Member
   - Build OPNFV Test Lab
   - Domestic OPNFV community activities
   - Function Proposal for OPNFV Functest
3. Lecture in OOL Events
4. Share knowhow to build OPNFV infrastructure with III（Taiwan）
5. Further activities

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1. Development of VNF Test Infrastructure

- **Motivation**
- About VNF Test Infrastructure
- Providing VNF Test Infrastructure
- Demonstration

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Motivation

Introduction

Okinawa Open Laboratory continue development of VNF Test Automation with Open Source Software

Start research to realize VNF Test Automation System on OPNFV

Why OPNFV?

- **OPNFV is known as open NFV platform**
- **OPNFV must be a de facto standard by close relationship with OpenStack**

Functest Project on OPNFV

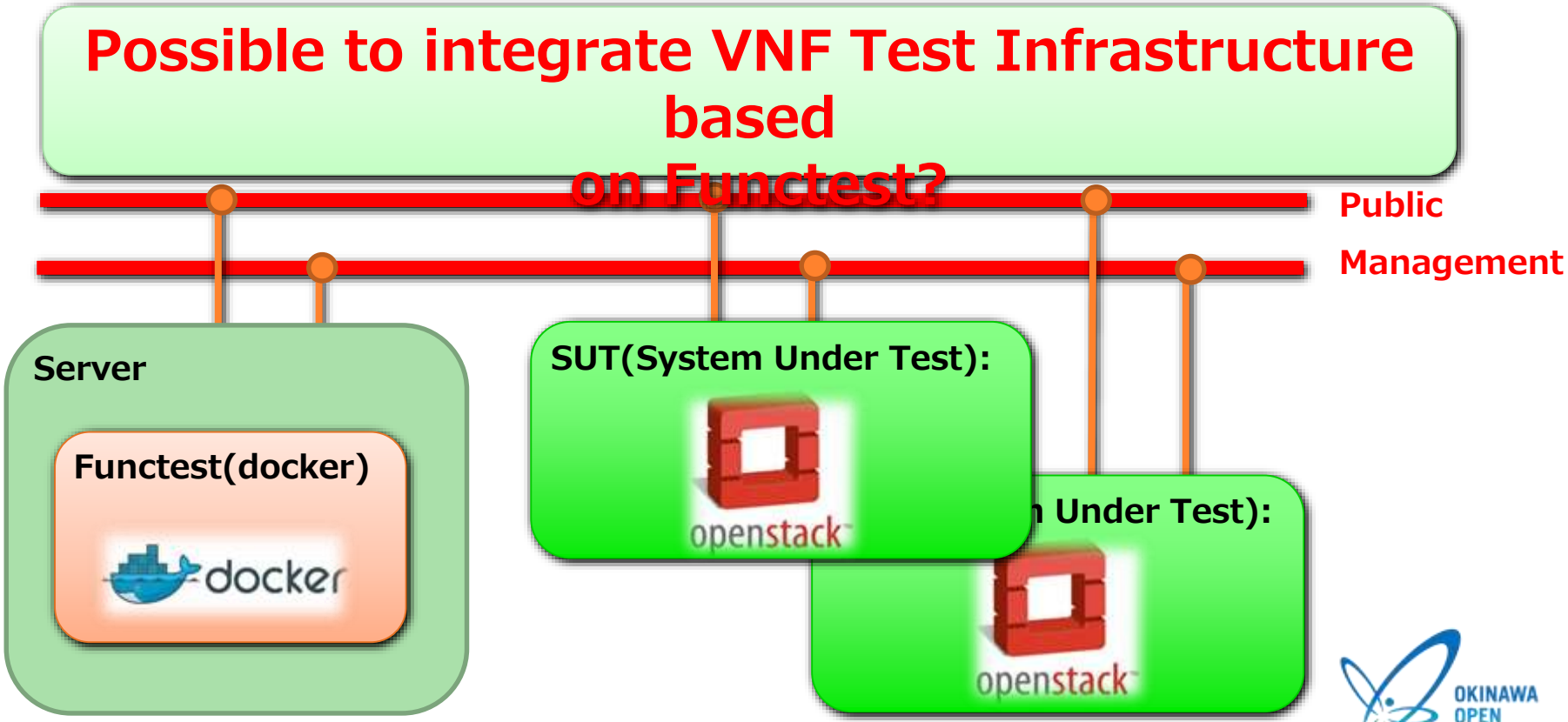
- **About Functest**
  - **One of test projects in OPNFV**
  - **Functional Test suite for IaaS built by OPNFV**
  - **Integrated with Open Source Software completely**

- **Current Functionality of Functest**
  1. **Deploy and Ping for VMs on IaaS automatically**
  2. **Test with OpenStack components like Tempest and Rally**
  3. **Test L2 function on OpenDaylight, L2/L3 function ONOS etc..**

NOT Supported Test for VNF(route r)

Environment to execute Functest

- Functest
  - Container base and Easy to prepare test
  - Methods to control OpenStack
  - Completely Open Source Software



Develop VNF Test Infrastructure with Functest

- Develop Development of VNF Test Infrastructure based on Functest with full open source

Challenge to develop VNF Test I nfrastructure based on Functest

- Realized functions in OOL based on Functest

  Functional test and Performance test for VNF

  - Functional Test

    Connectivity test of routers with BGP and OSPF

  - Performance Test

    Measurement of Throughput, Jitter and Packet Loss Rate

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1. Development of VNF Test Infrastructure

- Motivation
- **About VNF Test Infrastructure**
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- Demonstration

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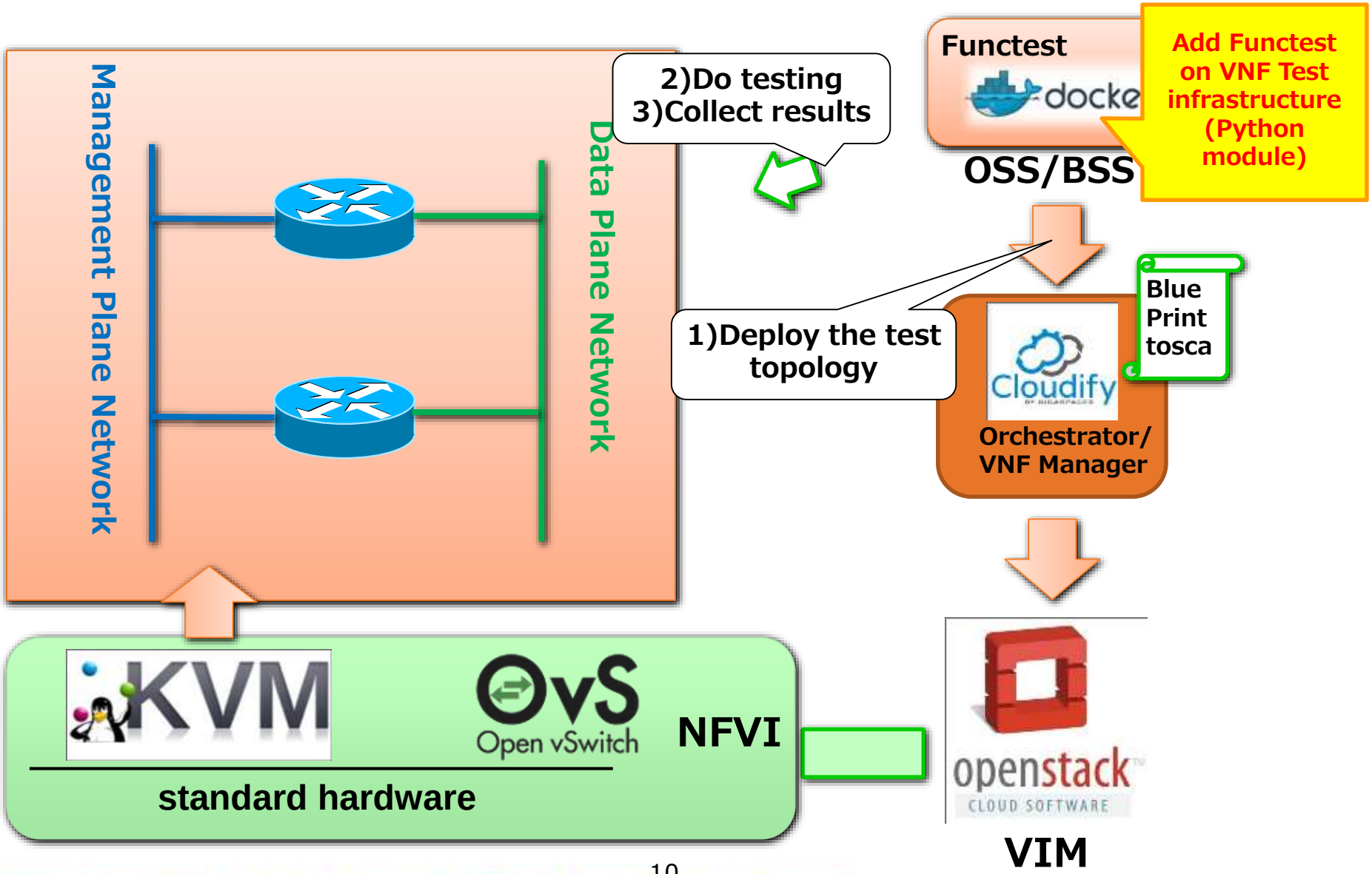
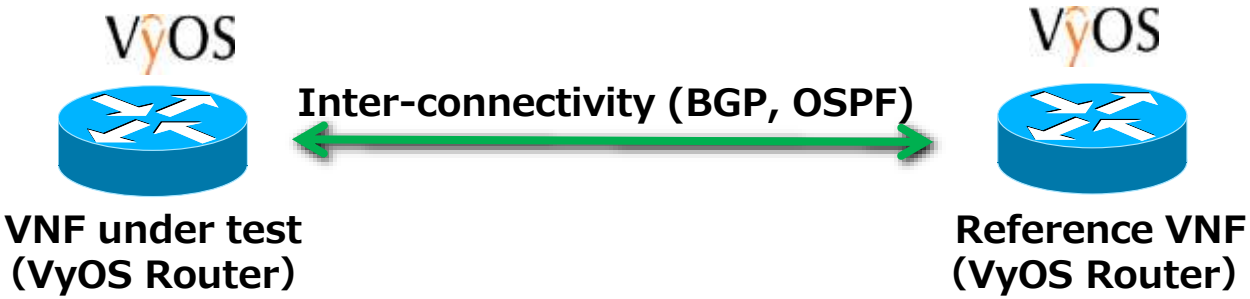
Architecture of VNF Test Infrastructure



Functional Test

- **Configuration**



- DUT VNF : VyOS (ver1.1.7)
- Test items : Interconnectivity test: BGP, OSPF

- **BGP**
  - Peering status
  - Number of advertised route
  - Send Route information properly
  - Receive end Route information properly
  - Collect routing table or not

- **OSPF**
  - Neighbor information
  - OSPF convergence status
  - Routing table is collect or ont
  - Retrieve Interface information
  - to confirm Routing information

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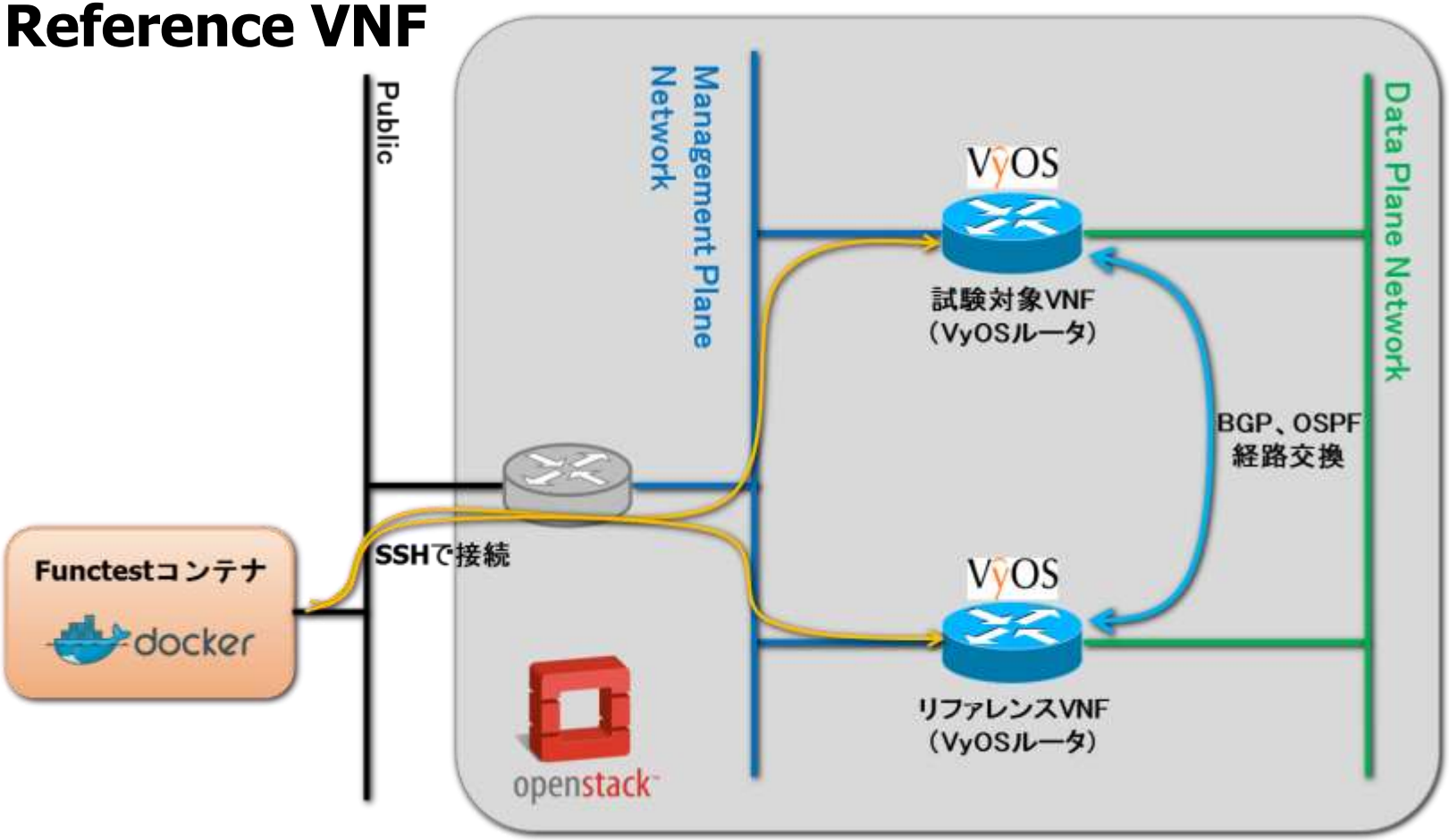
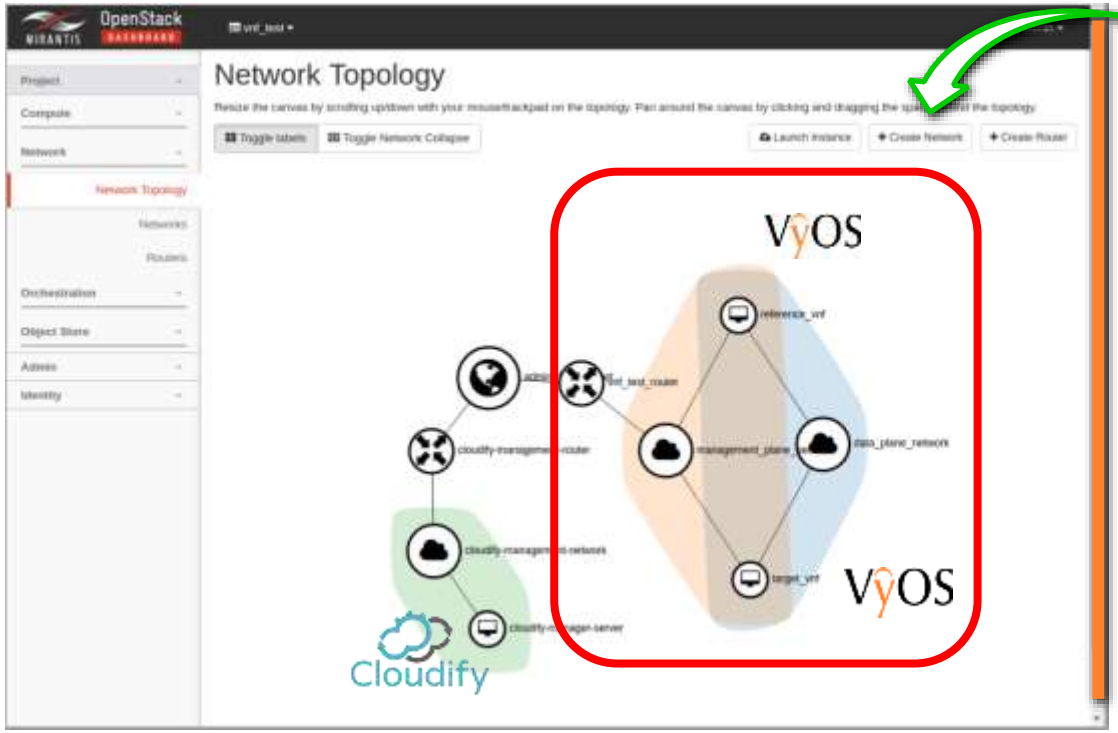
Topology for Functional Test

- **Interconnectivity test between VNF under test and Reference VNF**

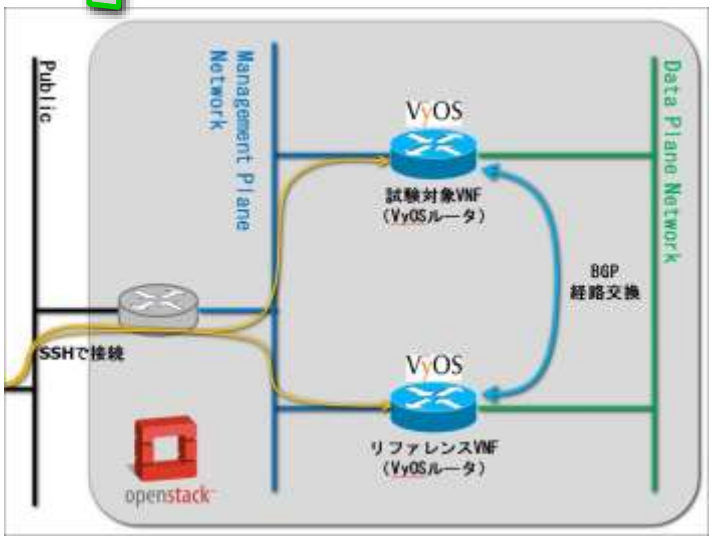


Conduct test on OpenStack

■ Network topology on OpenStack



Test topology



Run test after auto-deploy test topology for Functional test on OpenStack

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Result of Functional test

- **Result is displayed per test item**
  - **BGP interconnectivity**

```
vnf_test.ssh_client - INFO - SSH connect to 192.168.105.129.
vnf_test.ssh_client - INFO - SSH connection established to 192.168.105.129
vnf_test.cecker - INFO - ==========================================================
vnf_test.cecker - INFO -  Check bgp peer                                    | OK |
vnf_test.cecker - INFO - ==========================================================
vnf_test.cecker - INFO -  Check bgp status                                  | OK |
vnf_test.cecker - INFO - ==========================================================
vnf_test.cecker - INFO -  Check route advertise                             | OK |
vnf_test.cecker - INFO - ==========================================================
vnf_test.cecker - INFO -  Check route receive                               | OK |
vnf_test.cecker - INFO - ==========================================================
vnf_test.cecker - INFO -  Check route table                                 | OK |
run_tests - INFO - Test execution time: 04:04
run_tests - INFO - Execution exit value: 0
```

Peering status

BGP status

Advertised route number

Received route number

Routing Table

  - **OSPF interconnectivity**

```
vRouter.ssh_client - INFO - SSH connect to 192.168.105.129.
vRouter.ssh_client - INFO - SSH connection established to 192.168.105.129.
vRouter.checker - DEBUG - init checker
vRouter.checker - INFO - ==========================================================
vRouter.checker - INFO -  Checking the ospf neighbor                        | OK |
vRouter.checker - INFO - ==========================================================
vRouter.checker - INFO -  Checking the ospf status                          | OK |
vRouter.checker - INFO - ==========================================================
vRouter.checker - INFO -  Checking the routing entry                        | OK |
vRouter.checker - INFO - ==========================================================
vRouter.checker - INFO -  Checking the ospf interface                       | OK |
vRouter.vnf_controller - DEBUG - show ip ospf neighbor 200.200.200.2 | no-more
```

OSPF neighbor status

OSPF status

Routing Table

Interface status

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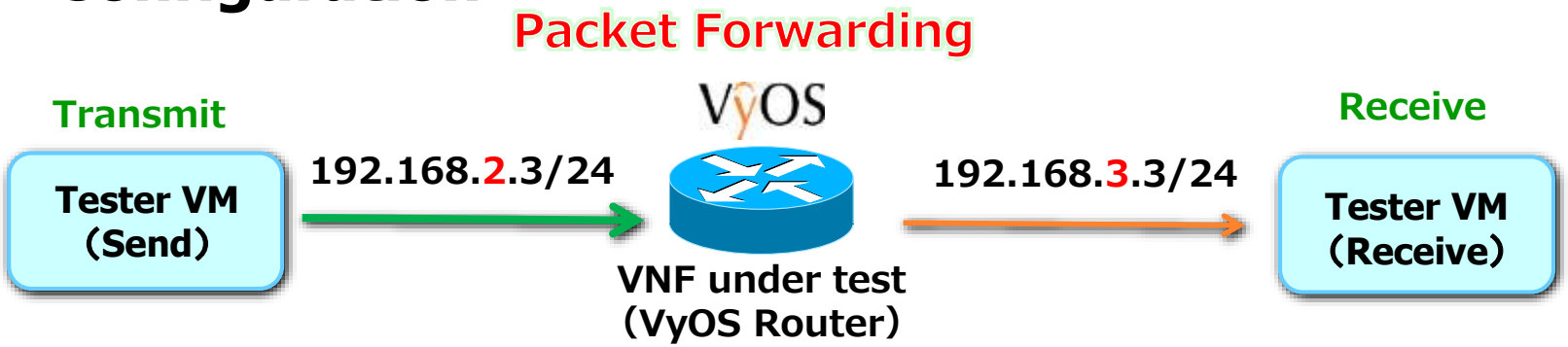
Performance Test

- **Configuration**



- VNF under test ： VyOS (ver1.1.7)
- Test item ： Performance measurement
  - **Measurement items**
    - **Throuput**
    - **Packet loss rate**
    - **Jitter**

Use iPerf for measurement

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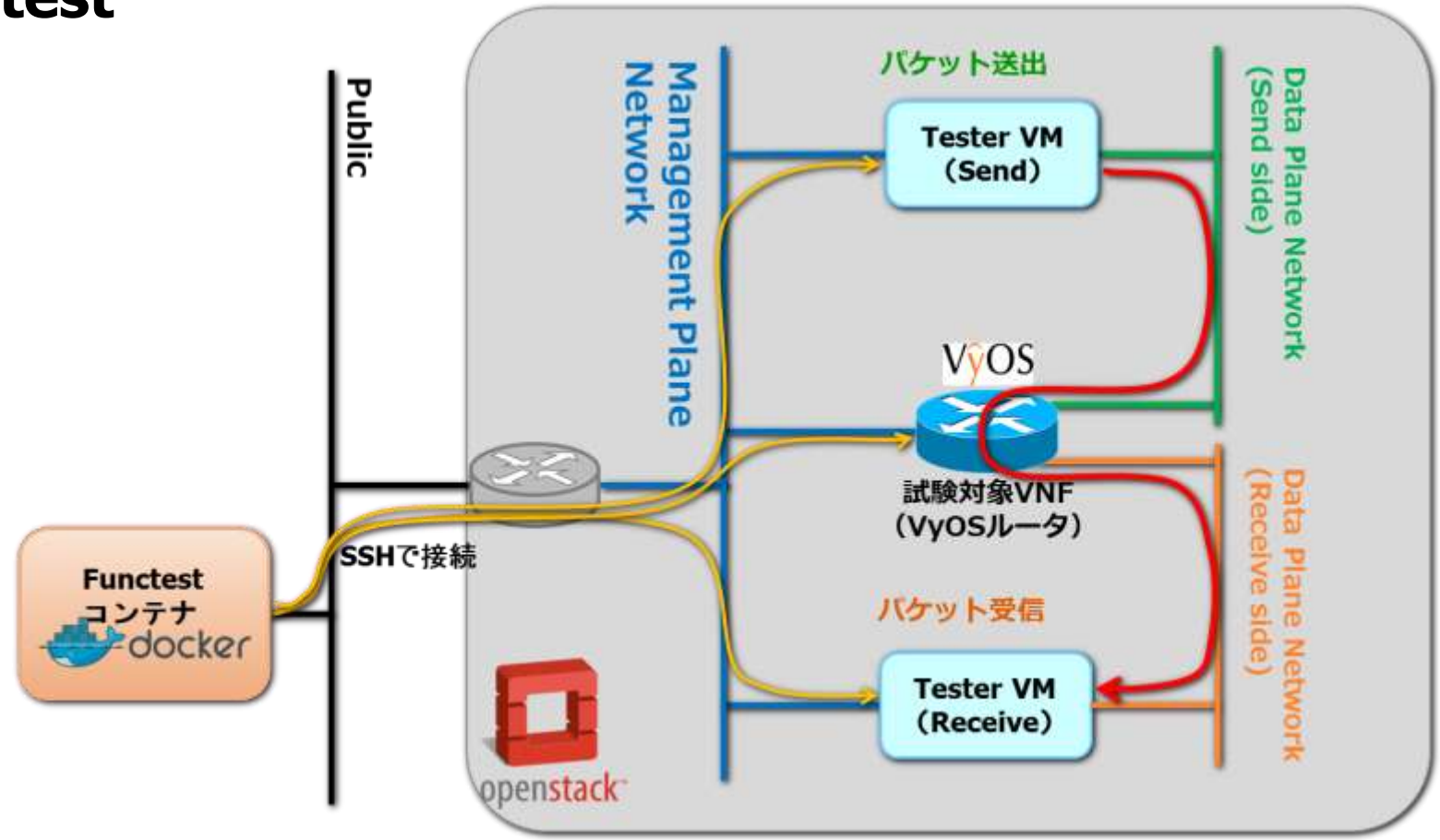
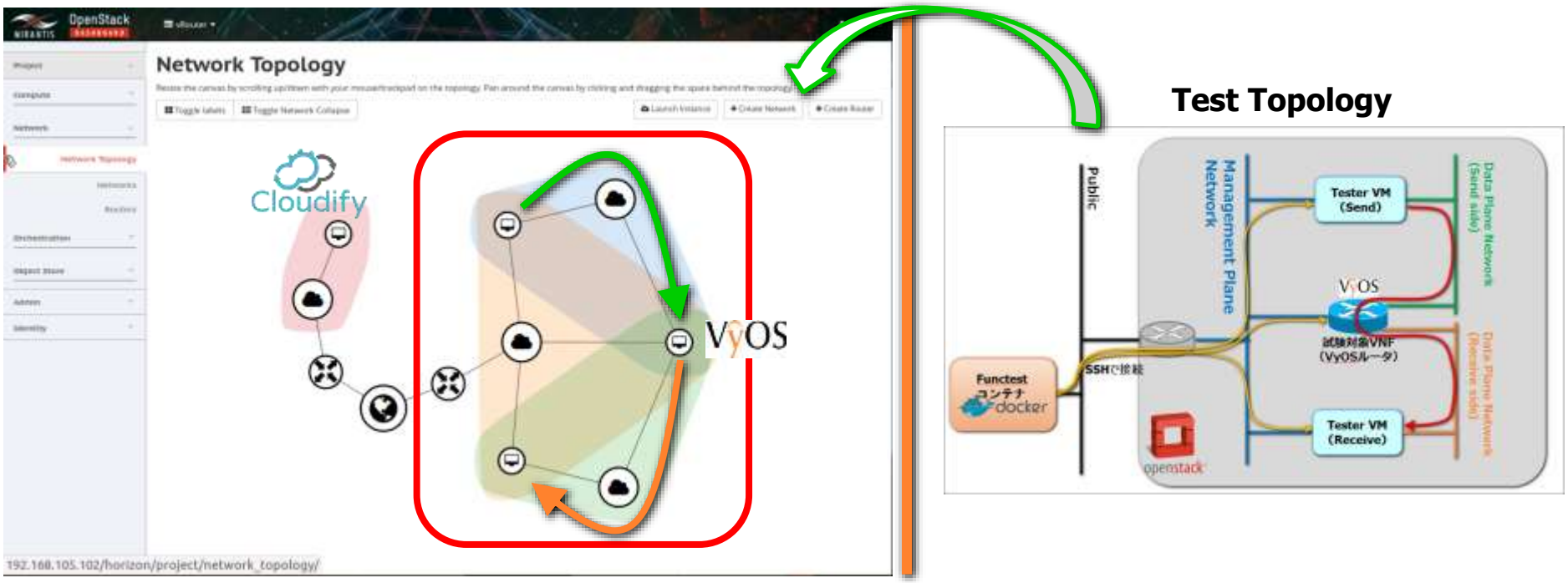
Topology for Performance test

- **Measure packet forwarding performance for VNF under test**



Conduct Test on OpenStack

- **Network topology on OpenStack**



Run test after auto-deploy test topology for Functional test on OpenStack

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Result of Performance test

■ Display Performance test result

```
INFO - ==========================================================================
INFO -  Performance test result
INFO -   Input Parameter:
INFO -     client_ip=192.168.2.2, server_ip=192.168.3.3
INFO -     udp, packet_size=1470byte, bandwidth=1000M, port=10000, time=10, count=5
INFO -
INFO -   Average:
INFO -     Transfer      Bandwidth        Jitter      Loss rate
INFO -     967 MBytes    811Mbits/sec     0.07 ms     0.1%
INFO -
INFO -   Total:
INFO -     number of tests =5
INFO -
INFO -     Lost/Total Datagrams
INFO -     4847.0/3452460.0
INFO - ==========================================================================
```

Throughput Jitter Packet Loss Rate

Summary

1. Easy to build VNF Test Infrastructure
   - Just run Docker container based on Functest, and finish preparation (Only OpenStack environment is necessary)

2. Possible to change VNF under test and target
   - Add VNF without changing source code of VNF Test Infrastructure (Provisioning for VNF is stored on command template)
   - Need VNF image and configuration template

3. Possible to change Test topology
   - Cloudify enables auto-deployment of test topology for each test
   - Add topology to create Blueprint loaded by Cloudify

We are writing Users Guide of Docker container, and want you members (especially, VNF users) to join and help us!

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1. Development of VNF Test Infrastructure

- Motivation
- About VNF Test Infrastructure
- **Providing VNF Test Infrastructure**
- Demonstration

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Providing VNF Test Infrastructure

- **Provide Docker container embedded VNF Test Infrastructure**
  - **Use to Download (pull) from Docker Hub Repository name: oolorg/vnf_test**
  - **Maintain Users Guide（Link is put on repository of Docker Hub）**

Google "Docker Hub oolorg/vnf_test"

Jump to this link

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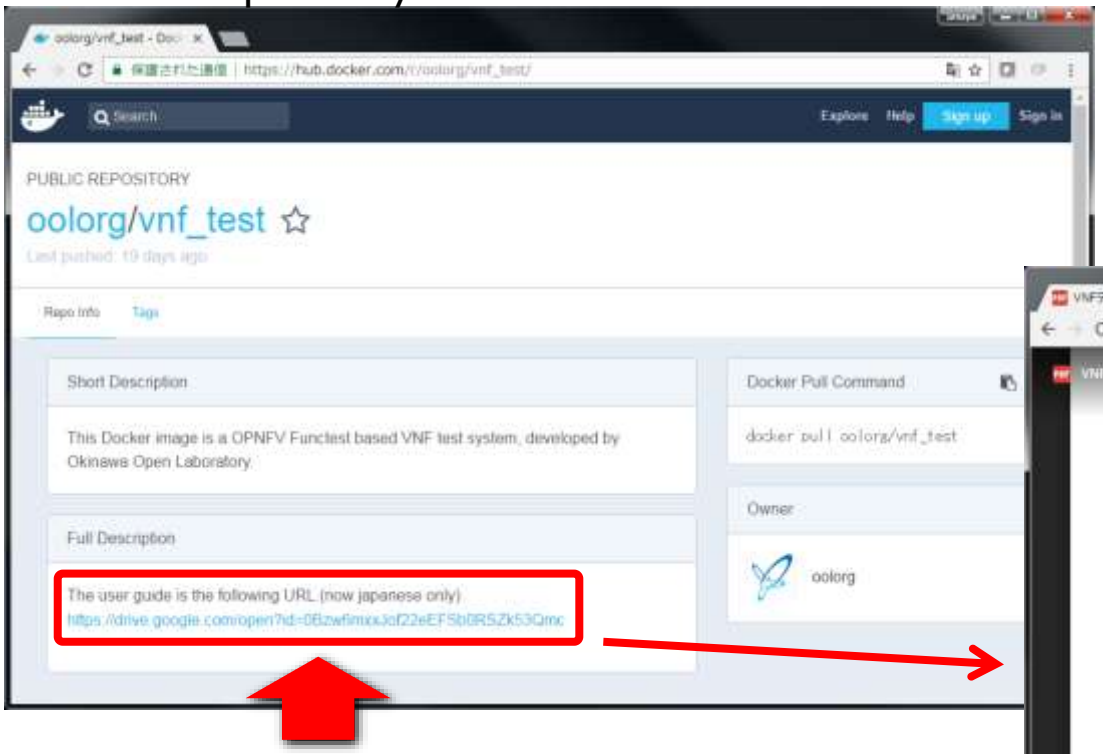
Providing VNF Test Infrastructure (Cont'd)

Repository of OOL on Docker Hub



Users Guide

Link for User's Guide

1. Development of VNF Test Infrastructure

- Motivation
- About VNF Test Infrastructure
- Providing VNF Test Infrastructure
- **Demonstration**

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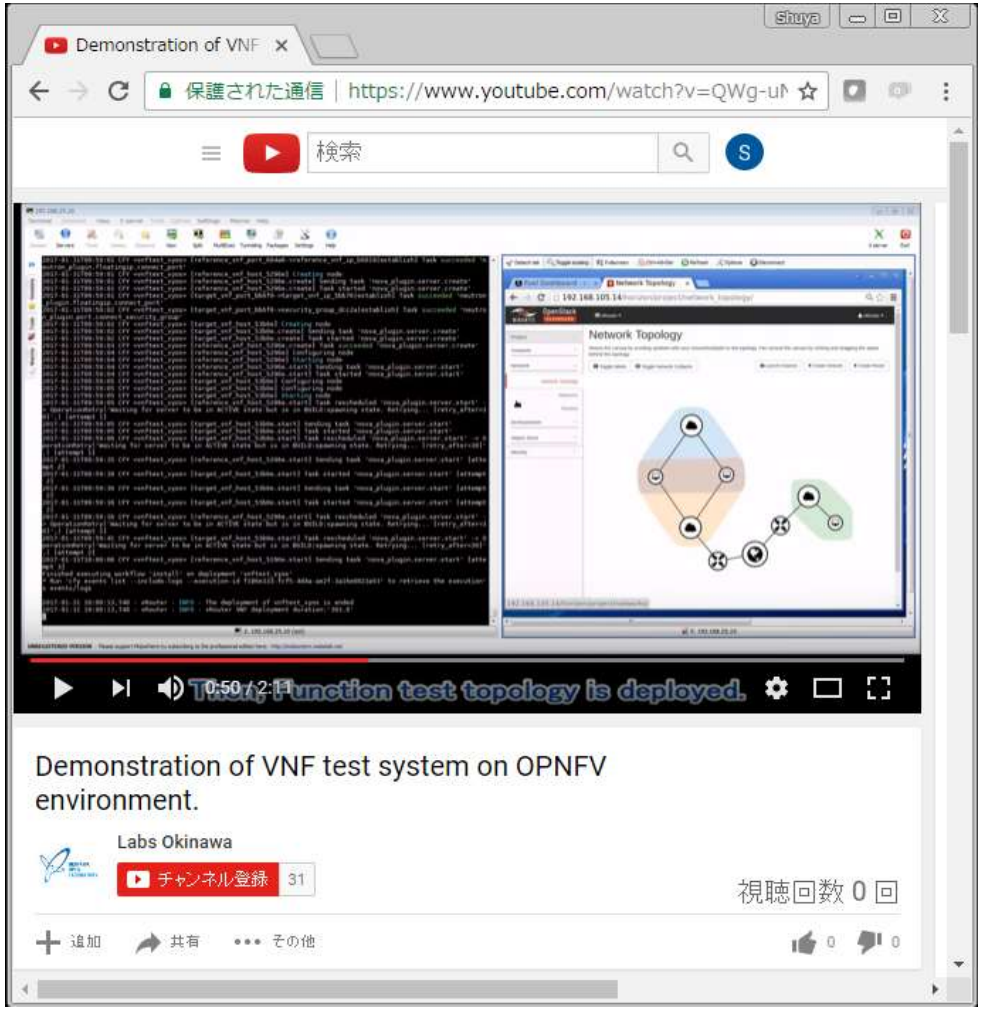
Demonstration

- **Demonstration of VNF Test Infrastructure**
  - **https://youtu.be/QWg-uNLhwdk**



2. Community Activities

- **Join OPNFV as Associate Member**
- Build OPNFV Test Lab
- Domestic OPNFV Community Activities
- Proposal to add function for OPNFV Functest

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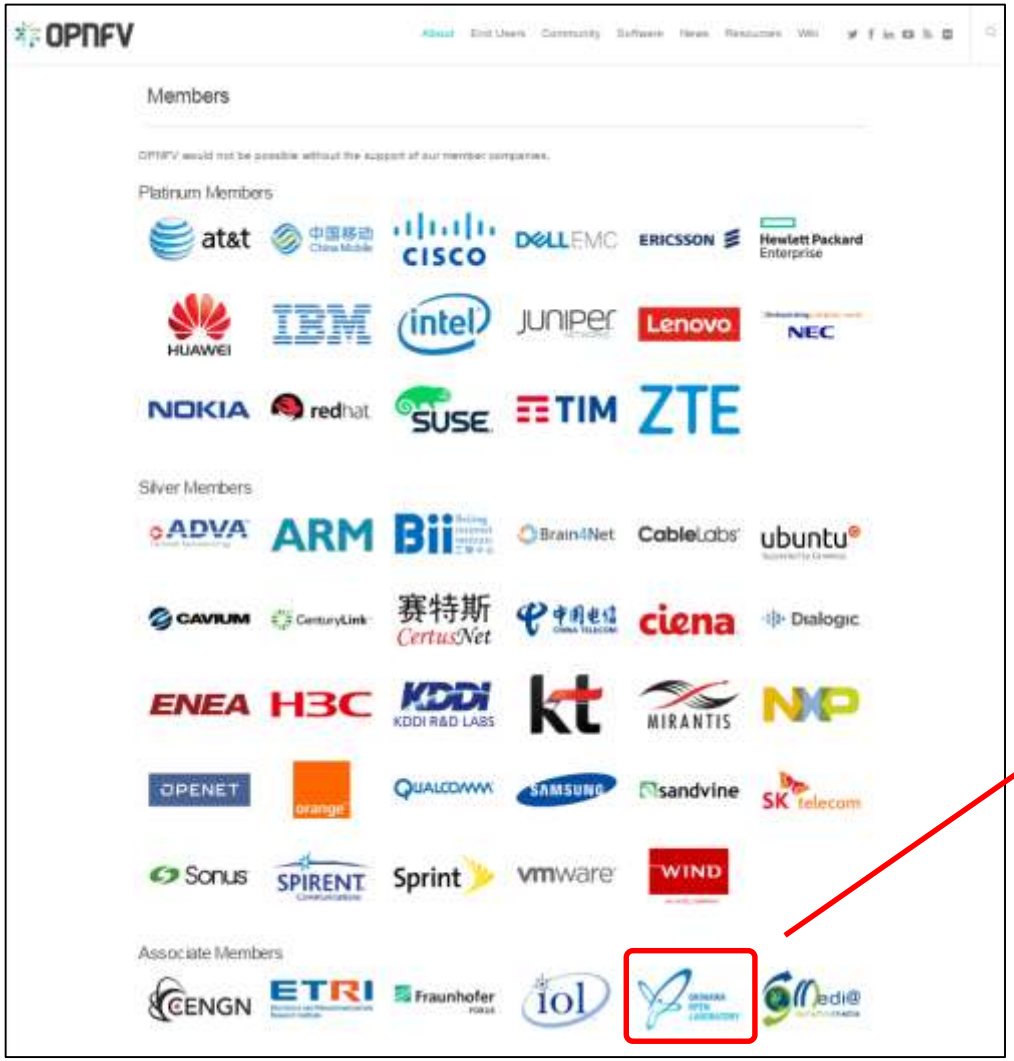
OPNFV Associate Member

- **OOL Joined OPNFV as Associate Member at MAR 2016**



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2. Community Activities

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- **Build OPNFV Test Lab**
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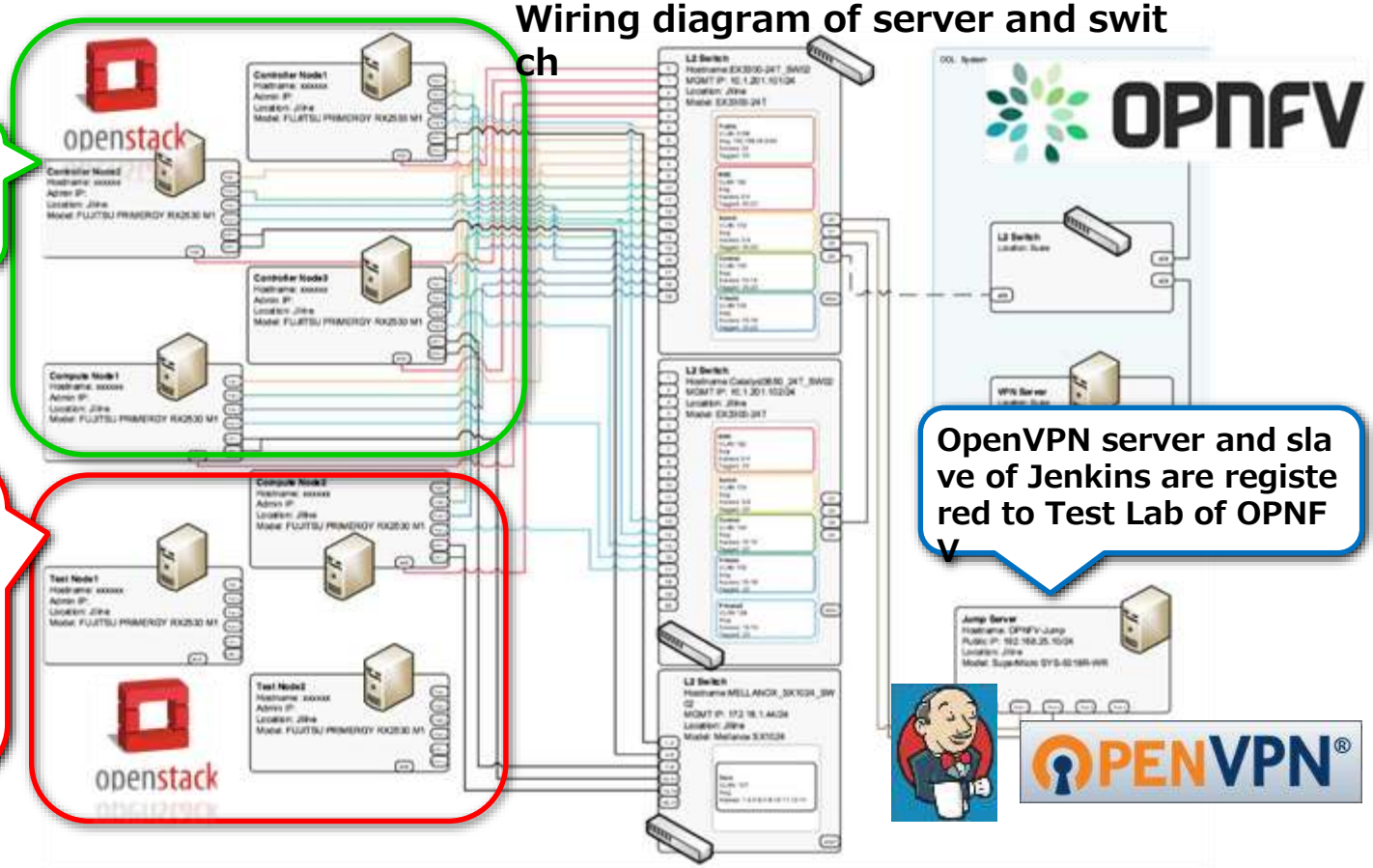
Build OPNFV Test Lab

- Japan's first OPNFV Test Lab was built on MAY 2016 and registered to OPNFV community
- There are 4 server OpenStack and 3 server OpenStack to use verification or CI environment

Wiring diagram of server and switch



Use for OOL activities
1) Controller Nodes
3) Compute Node

Use for CI of OPNFV community
- CI environment for "Doctor PJ" on OPNFV
- Realized by collaboration with PTL of Doctor PJ

OpenVPN server and slave of Jenkins are registered to Test Lab of OPNFV

Okinawa Open Laboratory OPNFV Community Test Lab

Build OPNFV Test Lab (Cont'd)

- **Wiki of OPNFV community**

OPNFV

Table Of Contents

7. OOL (Okinawa Open Laboratory) OPNFV Testlab
- 7.1. Overview
- 7.2. Environment
- 7.3. Access Procedure

This Page

Show Source

Quick search

Go

Enter search terms or a module, class or function name.

7. OOL (Okinawa Open Laboratory) OPNFV Testlab

7.1. Overview

Okinawa Open Laboratory provides the following facilities for OPNFV testing. The testlab is now located only at Okinwa in Japan. (We have plan to expand PODs and location.) The current depoyed version by Fuel installer on the POD is Brahmputra. It supports functest, yardstick projects testing. You can connect to CI. On each node an OPNFV solution will be installed based on Pharos Lab project. On top of this infrastructure several VNFs will be deployed. We provide VPN(OpenVPN) to connect the testlab. You can check how to connect at "Access Procedure".

7.2. Environment

The test lab POD is setup along the Pharos project guidelines. Servers are deployed in the the following configuration.

- 1 Jump server
- 3 Controller node
- 2 compute node

http://artifacts.opnfv.org/pharos/docs/labs/OOL.html

Verification Project with OPNFV Test Lab

- Functest and YardStick, both are test project of OPNFV, were verified and results were released to members at APR and JUN 2016 on Slack
- Introduced on SDN/Cloud seminar on OCT 2016

2. Community Activities

- Join OPNFV as Associate Member
- Build OPNFV Test Lab
- **Domestic OPNFV Community Activities**
- Proposal to add function for OPNFV Functest

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Domestic OPNFV Community Activities

- Tokyo OPNFV User Group was established in AUG 2016 and the first OPNFV Meetup was conducted on 9 SEP 2016 at Tokyo
  - Present session “Run VNF on Functest”

Tokyo OPNFV User Group

ホーム　メンバー　写真　ディスカッション　その他　　プロフィール

東京都, 日本
設立日 2016年7月4日

グループ概要...

シェアする

メンバー	133
レビュー	1
過去のMeetupイベント	1
カレンダー	
世界中	11

オーガナイザー:

Ryota Mibu

コンタクトする

概要:

OPNFV Meetup Tokyo #1

2016年9月9日 · 16:00
飯田橋 IIJ セミナールーム

アップロード

第1回目決まりました！

初回なので、まずはOPNFVの概要を紹介します。

NFVおよびOPNFVに興味のある方、是非ご参加ください。

【タイムテーブル】

16:00-16:10 案内
16:10-16:30 セッション1「OPNFVの概要紹介」 Ashiq Khan (NTTドコモ)
16:30-16:50 セッション2「OPNFVの約50プロジェクト概略」林 智史 (Red Hat)
16:50-17:00 休憩
17:00-17:20 セッション3「OPNFVをインストールしてみた」関谷 勇司 (東京大学)
17:20-17:40 セッション4「FunctestでVNFを動かしてみた」(沖縄オープンラボ)
17:40-18:00 フィードバック

91人が参加しました

Nakama Shuya

Ryota Mibu
オーガナイザー, イベントホスト
お会いできてよかったです

Yuuichi Fujioka
お会いできてよかったです

Masahiro Nakazato
お会いできてよかったです

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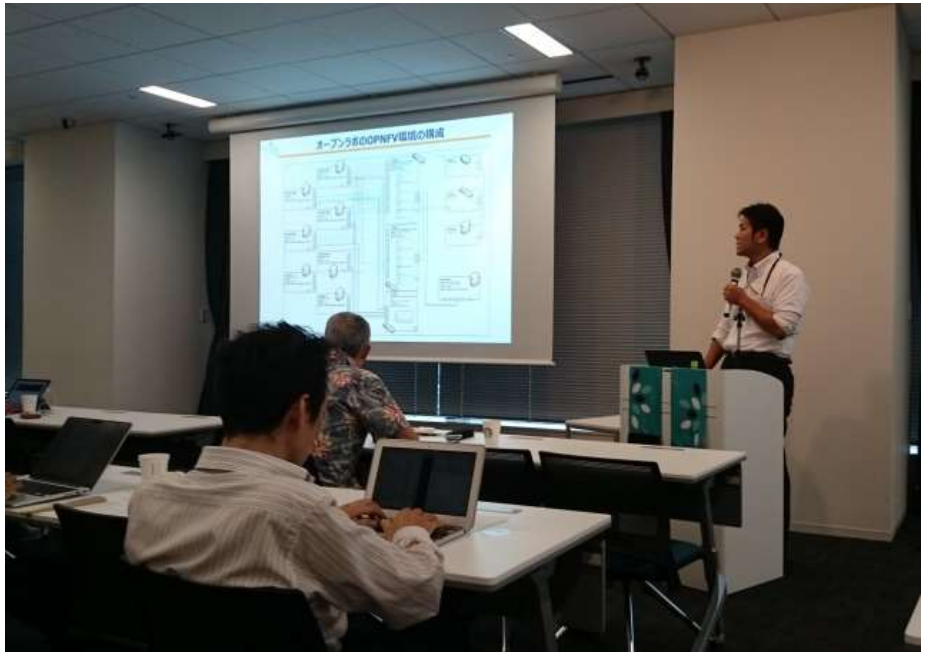
Domestic OPNFV Community Activities

- Presentation on OPNFV Meetup Tokyo #1



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2. Community Activities

- Join OPNFV as Associate Member
- Build OPNFV Test Lab
- Domestic OPNFV Community Activities
- **Proposal to add function for OPNFV Functest**

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Proposal to add function for OPNFV Functest

OOL developed original VNF Test Infrastructure based on Functest

Original development to OpenSource

Propose VNF Test Infrastructure as one of functions of Functest

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Proposal to add function for OPNFV Functest (Cont'd)

- Coming release of OPNFV（"D" Release）

Picked up as candidate of contribution of OPNFV
→ Source code was contributed

OPNFV スペース ユーザー ログ

Community | Developer | Documentation | Events | Infrastructure | Meetings | Others/Sketchpad | Projects | Software/Releases | Working Groups

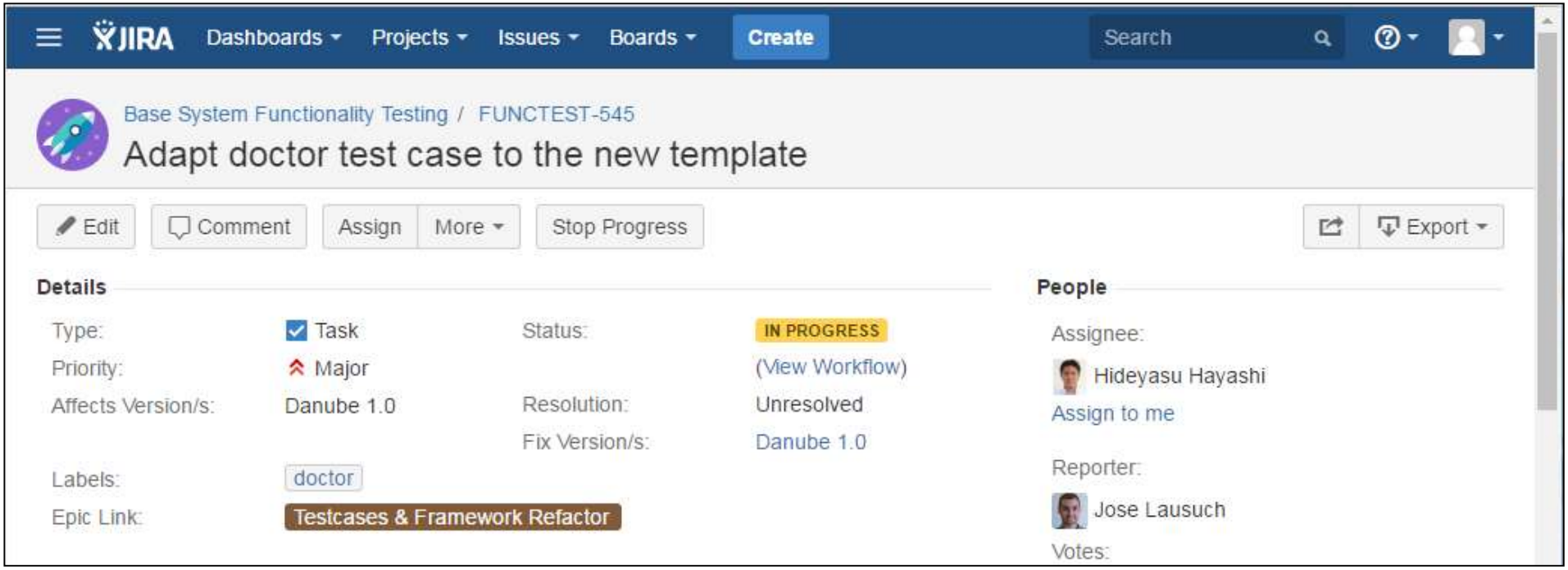
ページ / Opnfv Functional Testing

Candidate VNF	Description	Related project	Contact	Reference
vEPC	vEPC developped by OAI (Open Air Interface Team)	upstream OAI	Rohit Gupta <rohit.gupta AT	OAI vEPC
VyOS	test of VNF(VyOS) Interoperability for BGP Protocol.	Integrated in Functest	Hideyasu Hayashi <hideyasu.hayashi AT okinawaopenlabs.org>	https://github.com/oolorg/opnfv-functest-vnf
several	some already listed at https://wiki.opnfv.org/display/models/testing. Some of these will be used in the Colorado Plugfest - see the "VNF Portability" section on the page https://wiki.opnfv.org/display/EVNT/Colorado+Plugfest+Test+Cases. VNFMs will include Tacker, Cloudify, OpenBaton, etc. The tests will focus on simple to medium-complexity VNFs, specific TOSCA-based resource requirements as supported by those VNFMs, and YANG-based application control via ODL.	OPNFV Models	Bryan Sullivan <bs3131 AT att.com>	https://wiki.opnfv.org/display/models/testing
several	VES Hello World + VNFs integrated with VES. See VES project	OPNFV VES	Bryan Sullivan <bs3131 AT att.com>	
vCDN				
vIMS	Extension of vIMS test case for multisites		Valentin Boucher	

Contribution activities for OPNFV

- Contributing for Refactoring of Doctor test case related with refactoring action of Functest

Update and Commit source code to contribute community



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3. Lecture on OOL events

- Lecture on SDN/Cloud Seminar
- Session on OkinawaOpenDays2016
- Exhibition on OkinawaOpenDays2016

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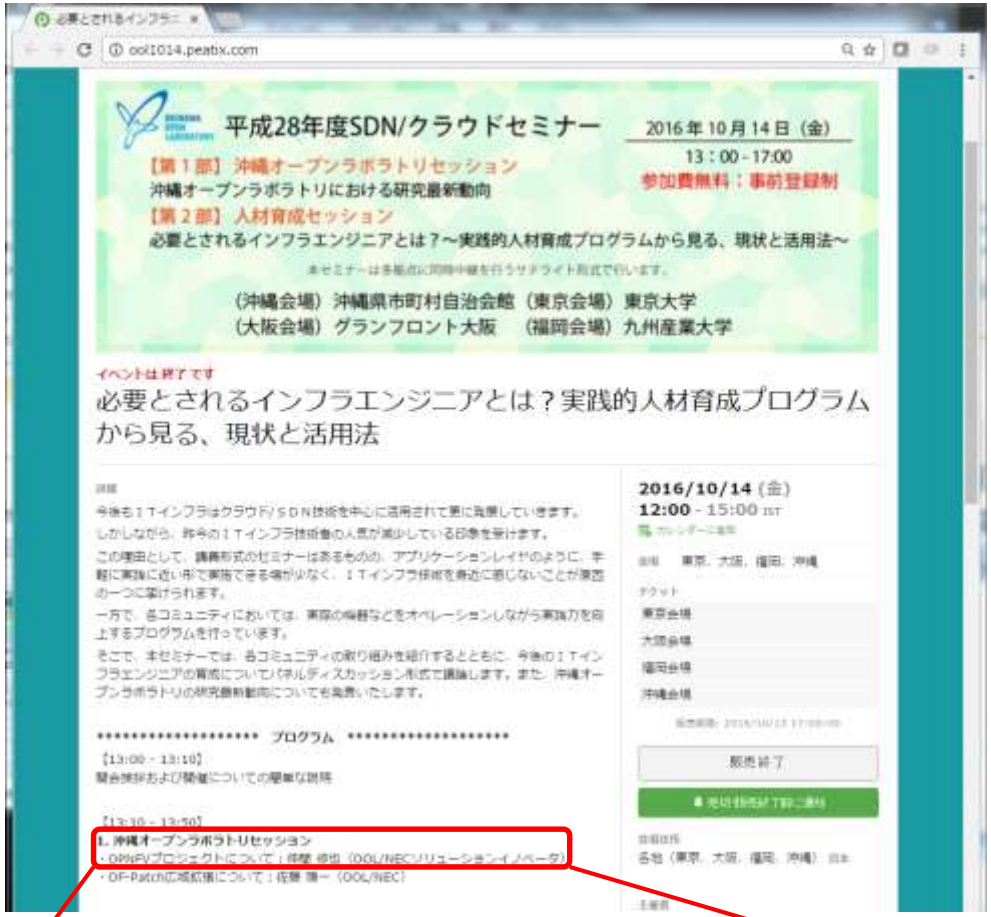
Lecture on SDN/Cloud Seminar



1. 沖縄オープンラボラトリセッション

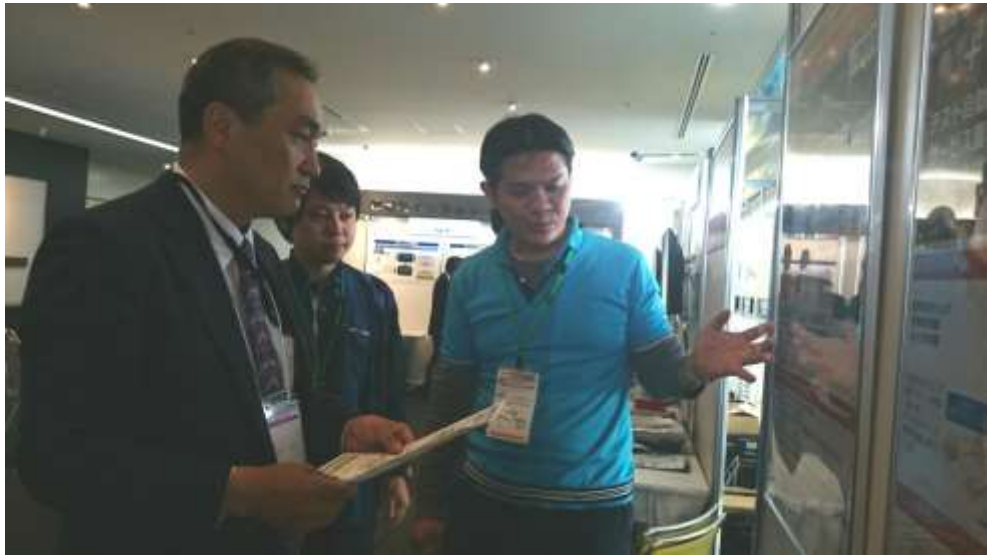
・OPNFVプロジェクトについて：仲間 修也（OOL/NECソリューションイノベータ）

Presentation & Exhibition on Okinawa Open Days 2016

- Presentation as General Track and Exhibition on OOL booth

Program

Exhibition



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4. Share knowhow to build OPNFV infrastructure with III (Taiwan)

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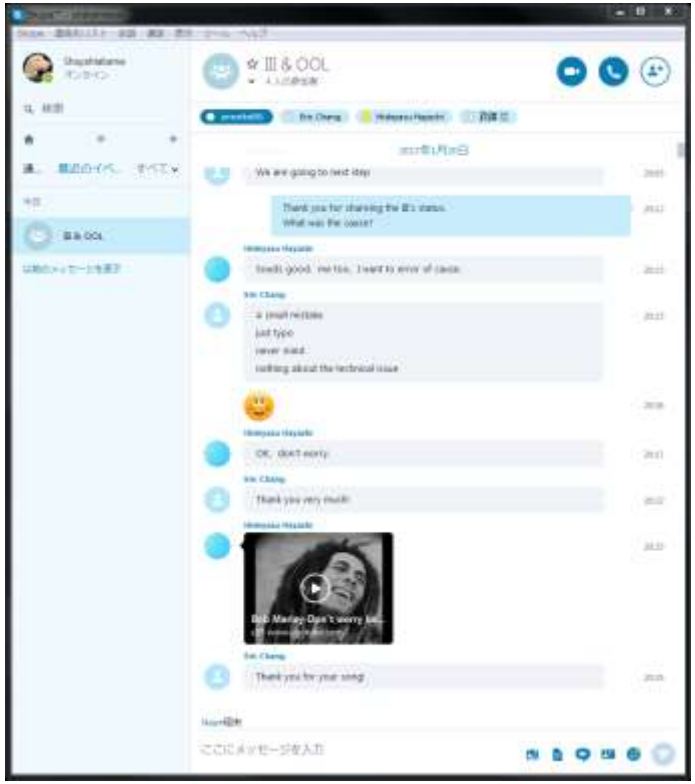
Share knowhow to build OPNFV with III

- III completed to build OPNFV Infrastructure with knowhow provided by OOL and support by skype

Relationship of OOL and III got closer with cooperation



Chatting on Skype

Eric, Annette and James building OPNFV infrastructure

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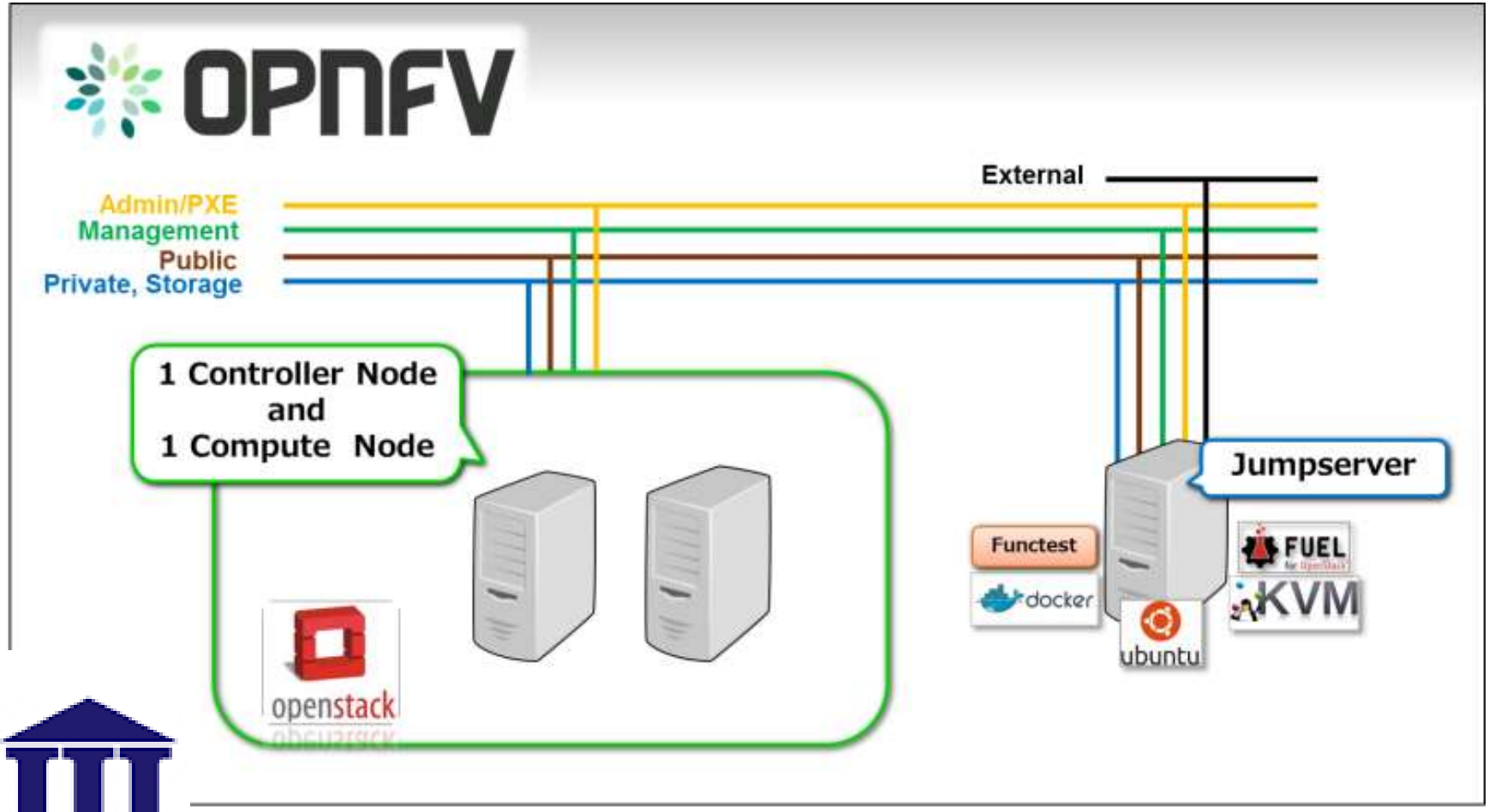
Share knowhow to build OPNFV with III

- OPNFV infrastructure on III



5. Further Activities

Further Activities

- Contribution activity for OPNFV Functest
  - Commit source code of VNF Test Infrastructure as one of functions of Functest
  - Support refactoring of test case for Doctor Project on OPNFV

- Collaboration with III (Taiwan)
  - Verification of Functest will be conducted on OPNFV infrastructure on III
  - Interconnection between III and OOL will be established
  - Conduct VNF test with developed VNF Test Infrastructure on the inter-connected network between III and OOL
  - Conduct PoC with inter-connected infrastructure of III and OOL
    (III plans PoC of vEPC based on OpenEPC)

  And so on

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Thank You!
ご清聴ありがとうございました