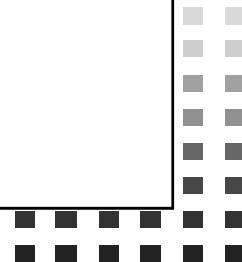




# **BMWG – Containerized Infrastructure Benchmarking**

**IETF 112  
November 1-5, 2021  
Online**



# Hackathon Plan

- The main goal is to figure out container networking performance impacts by various resource options.
  - Related Draft:  
Considerations for Benchmarking Network Performance in Containerized Infrastructures  
<https://tools.ietf.org/html/draft-dcn-bmwg-containerized-infra>
  - Two main features
    - Implementing containerized infrastructure with various network models
    - Verifying performance impacts depending on configuration settings

# Hackathon Plan

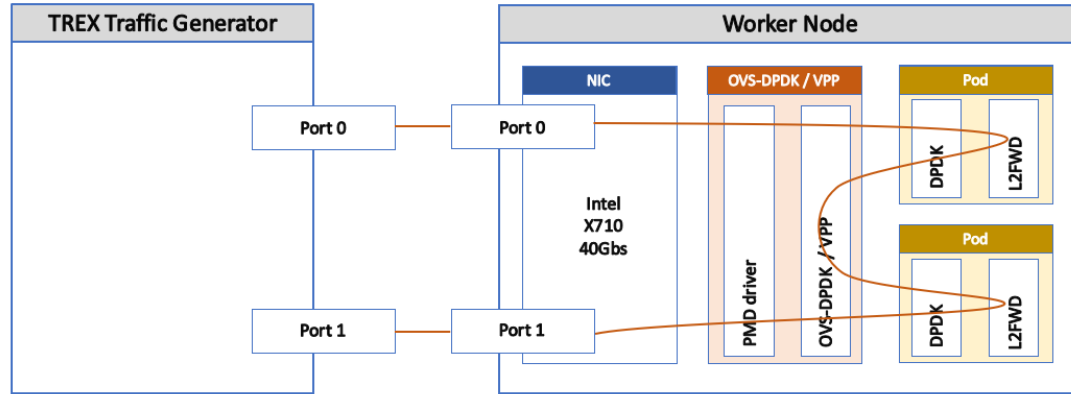
- Plan for Hackathon-112

## **BMWG – Containerized Infrastructure Benchmarking**

- Champion(s)
  - Younghak Kim <younghak at ssu.ac.kr>
  - Minh-Ngoc Tran(mipearlska1307 at dcn.ssu.ac.kr)
  - KJ Sun(gomjae at dcn.ssu.ac.kr)
- Project(s)
  - Benchmarking packet loss rate in Multi-Pods scenario with different acceleration technologies
    - VPP, OVS/DPDK
  - Multi-Pods scenario performance Impact depending on different resources allocation (NUMA, memory, ...)
- Specification(s)
  - ➡ <https://datatracker.ietf.org/doc/html/draft-dcn-bmwg-containerized-infra>

# What got done

- Benchmarking Scenario – Multi Pods



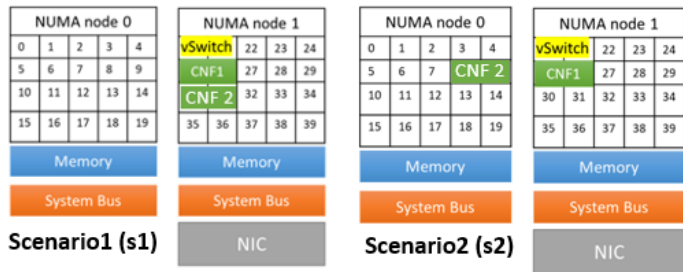
\* Traffic is transmit from generator through 2 pods and vSwitches

\* In both case, Multus CNI and Userspace CNI plugin are used to create multiple interface of VNF

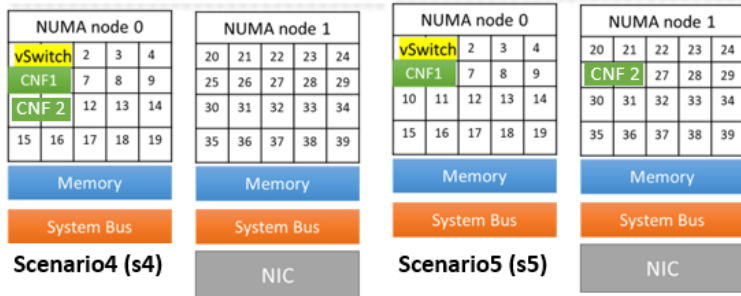
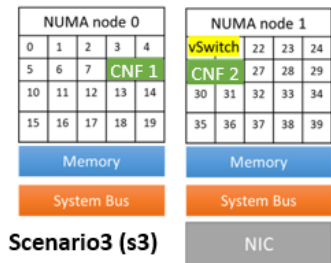
\* C-VNF : dpdk-l2fwd

# What got done

- Benchmarking Scenario – NUMA Alignment



Vswitch  
same  
NUMA node  
with NIC



Vswitch  
different  
NUMA node  
with NIC

- \* CNF 1: receives incoming packets from T-Gen then transmit to CNF2
- \* CNF 2: transmits packets back to T-Gen
- \* In the scenario where both 2 CNFs are placed in different NUMA, Placement of receiving incoming packet CNF vs vSwitch is considered
- \* We don't consider both 2 CNFS in different node with vSwitch case, as it degrades performance in single-pod scenario

# What got done

- Benchmarking Configuration
- Hardware – Worker Node

CPU	Intel(R) Xeon(R) Gold 5220R CPU @ 2.20GHz 48 CPU cores * 2 NUMA nodes
Memory	256GB: 32GB x 4DIMMs x 2 NUMA nodes @ 2400MHz
NIC	Intel Corporation Ethernet Network Adapter X71-40Gbps
Microcode	0x5003102
Intel NIC Device ID	0x1572
Intel NIC Firmware version	6.01 0x800035cf 1.1747.0
BIOS setting	CPU Power and Performance Policy <Performance> CPU C-state Disabled CPU P-state Disabled Intel(R) Hyper-Threading Tech Enabled Turbo Boost Disabled

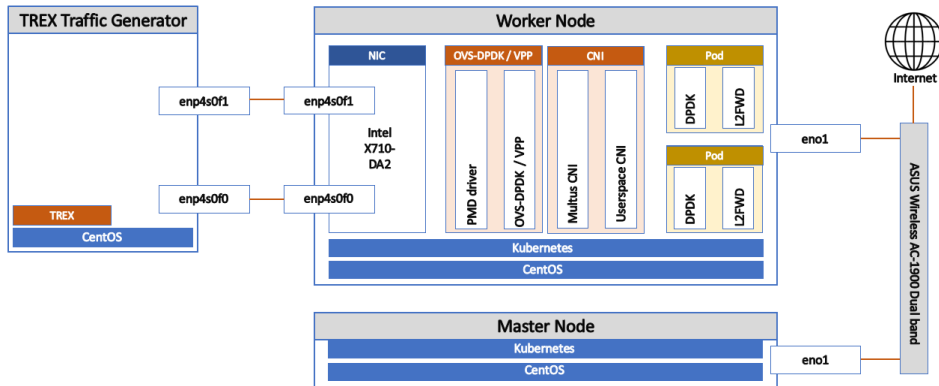
- Traffic Generator : T-Rex (v2.92)

Name	T-Rex
Version	2.92
Benchmark method	T-Rex Non Drop Rate application (accepted percentage of drop rate is less than 0.1%)

- Software

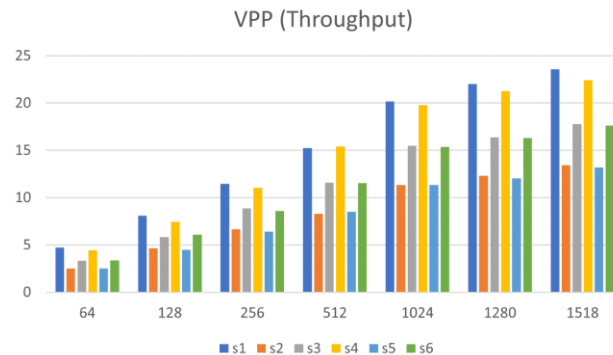
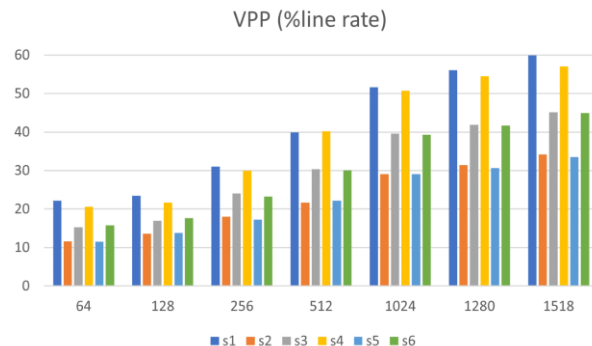
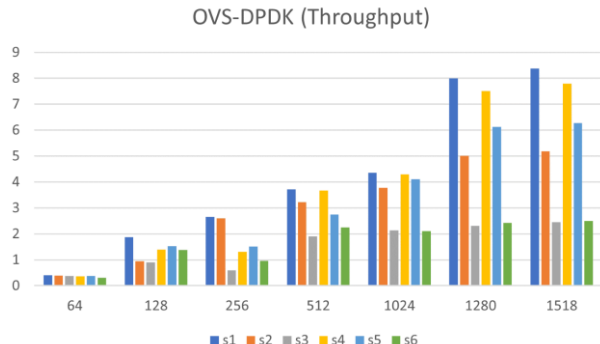
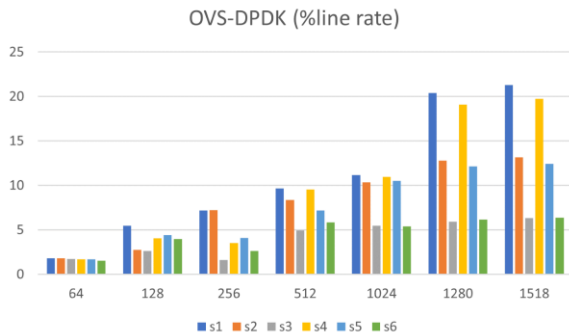
Operating System	CentOS Linux 7
Linux Kernel Version	3.10.0-1160.31.1.el7.x86_64
GCC version	gcc version 4.8.5 20150623 (Red Hat 4.8.5-44)
DPDK version	20.11
Hugepages	1Gi

- Testbed Design Figure



# What we learned

- Benchmarking Performance Results



# What we learned

- Benchmarking Performance Results

1. VPP outperforms OVS

2. NUMA alignment:

- **vSwitch and NIC:** almost the same, place on different nodes slightly degrade performance in 1024+ packet size (s1,2,3 vs s4,5,6)
- **CNFs and vSwitch:** separate placement of CNFs significantly degrade performance 10-15% (s1 vs 2,3 and s4 vs 5,6)
- **Receiving packet CNF1 and vSwitch:**
  - OVS-DPDK: CNF1 and vSwitch in same node has higher performance (s2 > s3, s5 > s6)
  - VPP: CNF1 and vSwitch in different nodes has higher performance (s3 > s2, s6 > s5)



# What we learned

- Future Works
  - Troubleshooting CNF1, vSwitch NUMA alignment result
  - Consider multiple vSwitches case (1 vSwitch each NUMA node)
  - Plan to discuss the results with other related community (e.g., ViNePERF in Anuket)

# Wrap Up

Team members:

**Younghan Kim (SSU)**

**KJ Sun (SSU)**

**Minh Ngoc Tran(SSU)**

**Hokeun Lim (SSU)**

**Phuong Bac Ta(SSU)**

Git repo:

<https://github.com/huyng14/bmwg-container-networking>

IETF Korea Forum:

Remote Hackathon Event at Busan

with I2NSF, IPWAVE (SKKU team)

