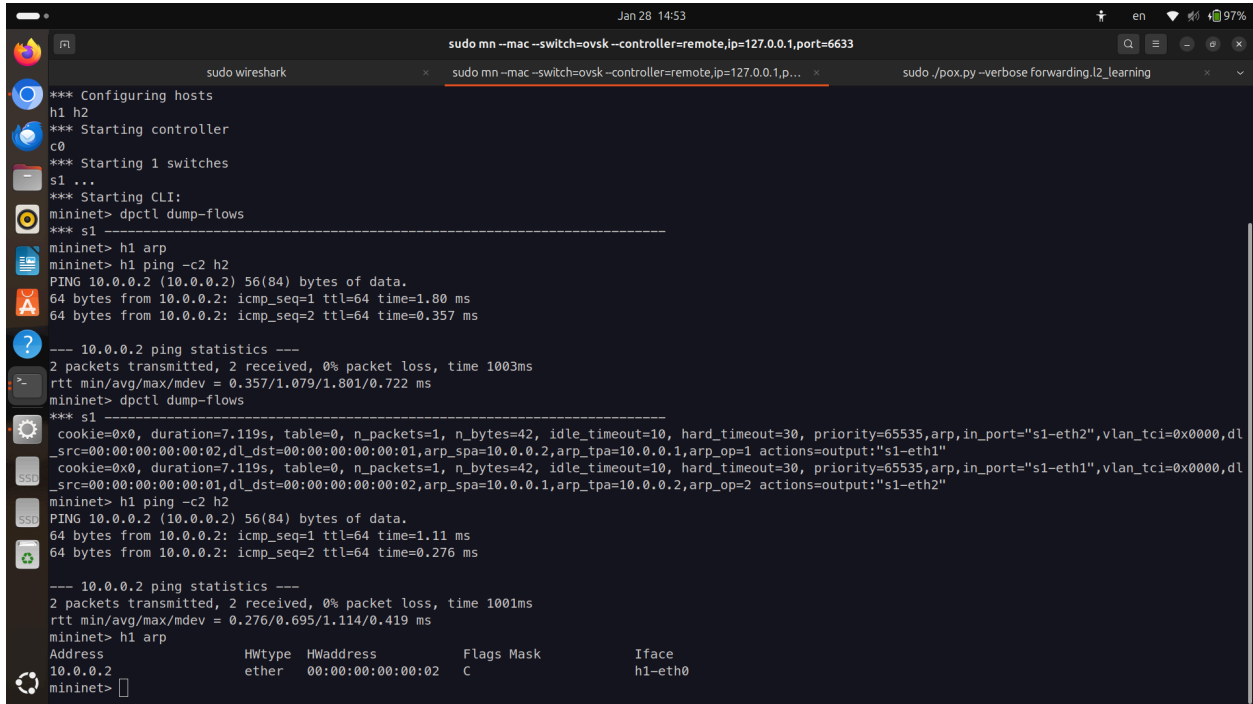


Assignment 5

นายนิธิโรจน์ นันทวโนทยาน 663040653-3

LAB POX



```
Jan 28 14:53
sudo mn --mac --switch=ovsk --controller=remote,ip=127.0.0.1,port=6633
*** Configuring hosts
h1 h2
*** Starting controller
c0
*** Starting 1 switches
s1 ...
*** Starting CLI:
mininet> dpctl dump-flows
*** s1 -----
mininet> h1 arp
mininet> h1 ping -c2 h2
PING 10.0.0.2 (10.0.0.2) 56(84) bytes of data.
64 bytes from 10.0.0.2: icmp_seq=1 ttl=64 time=1.80 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.357 ms

--- 10.0.0.2 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1003ms
rtt min/avg/max/mdev = 0.357/1.079/1.801/0.722 ms
mininet> dpctl dump-flows
*** s1 -----
cookie=0x0, duration=7.119s, table=0, n_packets=1, n_bytes=42, idle_timeout=10, hard_timeout=30, priority=65535,arp,in_port="s1-eth2",vlan_tci=0x0000,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:00:01,arp_spa=10.0.0.2,arp_tpa=10.0.0.1,arp_op=1 actions=output:"s1-eth1"
cookie=0x0, duration=7.119s, table=0, n_packets=1, n_bytes=42, idle_timeout=10, hard_timeout=30, priority=65535,arp,in_port="s1-eth1",vlan_tci=0x0000,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:02,arp_spa=10.0.0.1,arp_tpa=10.0.0.2,arp_op=2 actions=output:"s1-eth2"
mininet> h1 ping -c2 h2
PING 10.0.0.2 (10.0.0.2) 56(84) bytes of data.
64 bytes from 10.0.0.2: icmp_seq=1 ttl=64 time=1.11 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.276 ms

--- 10.0.0.2 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 0.276/0.695/1.114/0.419 ms
mininet> h1 arp
Address HWtype HWaddress Flags Mask Iface
10.0.0.2 ether 00:00:00:00:00:02 C h1-eth0
mininet>
```

รูปที่ 1 Mininet Configuration

```
Jan 28 14:51
sudo ./pox.py --verbose forwarding.l2_learning

nithiroj@nithiroj-Nitro-AN515-57 ~$ cd pox
nithiroj@nithiroj-Nitro-AN515-57 ~$ sudo ./pox.py --verbose forwarding.l2_learning
[sudo] password for nithiroj:
POX 0.7.0 (gar) / Copyright 2011-2020 James McCauley, et al.
DEBUG:core:POX 0.7.0 (gar) going up...
DEBUG:core:Running on CPython (3.12.3/Nov 6 2025 13:44:16)
DEBUG:core:Platform is Linux-6.14.0-37-generic-x86_64-with-glibc2.39
WARNING:version:POX requires one of the following versions of Python: 3.6 3.7 3.8 3.9
WARNING:version:You're running Python 3.12.
WARNING:version:If you run into problems, try using a supported version.
INFO:core:POX 0.7.0 (gar) is up.
DEBUG:openflow.of_01:Listening on 0.0.0.0:6633
INFO:openflow.of_01:[00-00-00-00-00-01 2] connected
DEBUG:forwarding.l2_learning:Connection [00-00-00-00-01 2]
DEBUG:openflow.of_01:1 connection aborted
```

รูปที่ 2 Controller pox information ก่อน ping

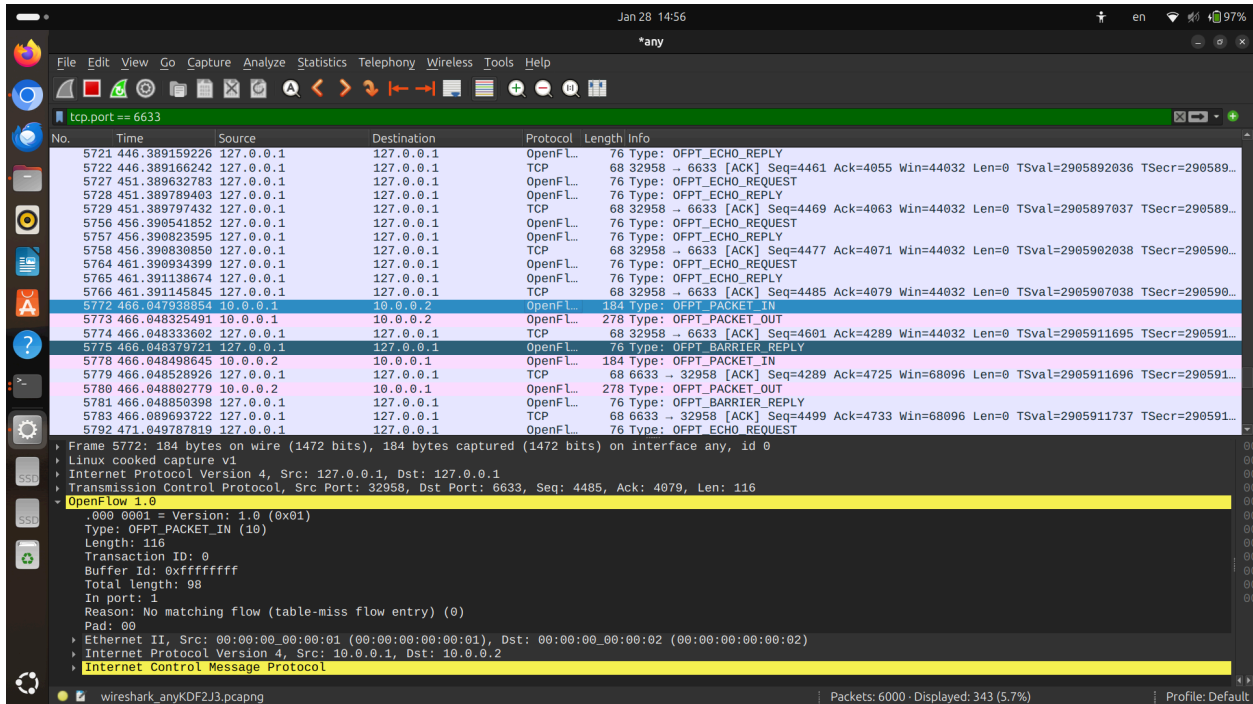
```
Jan 28 14:51
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
*any

tcp.port == 6633

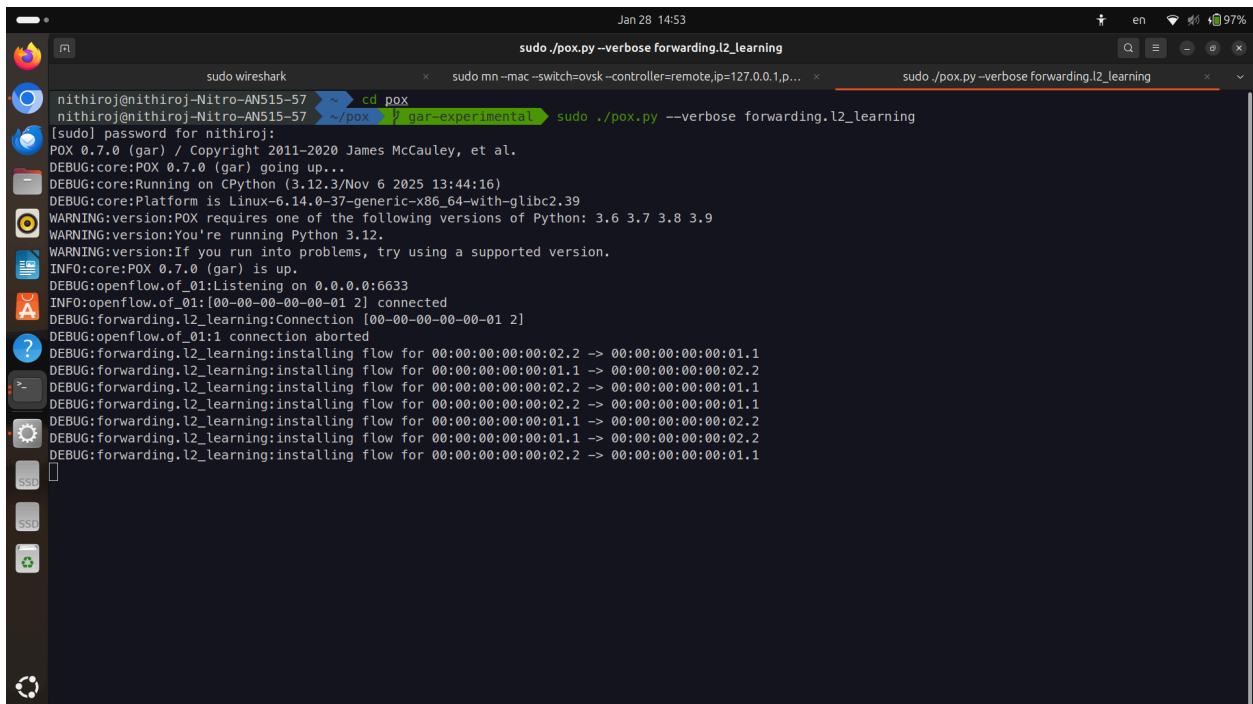
No. Time Source Destination Protocol Length Info
3503 145.580581020 127.0.0.1 127.0.0.1 TCP 76 32948 -> 6633 [SYN] Seq=0 Win=43690 Len=0 MSS=65495 SACK_PERM TSval=2905591228 TSecr=2905591228
3504 145.580592940 127.0.0.1 127.0.0.1 TCP 76 6633 -> 32948 [SYN, ACK] Seq=0 Ack=1 Win=65483 Len=0 MSS=65495 SACK_PERM TSval=2905591228 TSecr=2905591228
3505 145.580601155 127.0.0.1 127.0.0.1 TCP 68 32948 -> 6633 [ACK] Seq=1 Ack=1 Win=44032 Len=0 TSval=2905591228 TSecr=2905591228
3506 145.580607295 127.0.0.1 127.0.0.1 TCP 68 32948 -> 6633 [FIN, ACK] Seq=1 Ack=1 Win=44032 Len=0 TSval=2905591228 TSecr=2905591228
3507 145.580772831 127.0.0.1 127.0.0.1 TCP 76 6633 -> 32948 [PSH, ACK] Seq=1 Ack=2 Win=65536 Len=0 TSval=2905591228 TSecr=2905591228
3508 145.580784892 127.0.0.1 127.0.0.1 TCP 56 32948 -> 6633 [RST] Seq=2 Win=0 Len=0
3541 145.648851065 127.0.0.1 127.0.0.1 TCP 76 32958 -> 6633 [SYN] Seq=0 Win=43690 Len=0 MSS=65495 SACK_PERM TSval=2905591296 TSecr=2905591296
3542 145.648864382 127.0.0.1 127.0.0.1 TCP 76 6633 -> 32958 [SYN, ACK] Seq=0 Ack=1 Win=65483 Len=0 MSS=65495 SACK_PERM TSval=2905591296 TSecr=2905591296
3543 145.648873713 127.0.0.1 127.0.0.1 TCP 68 32958 -> 6633 [ACK] Seq=1 Ack=1 Win=44032 Len=0 TSval=2905591296 TSecr=2905591296
3544 145.649078937 127.0.0.1 127.0.0.1 OpenFL 76 Type: OFPT_HELLO
3545 145.649084139 127.0.0.1 127.0.0.1 OpenFL 76 Type: OFPT_HELLO
3546 145.649089113 127.0.0.1 127.0.0.1 TCP 68 6633 -> 32958 [ACK] Seq=9 Ack=9 Win=65536 Len=0 TSval=2905591296 TSecr=2905591296
3547 145.649096251 127.0.0.1 127.0.0.1 TCP 68 32958 -> 6633 [ACK] Seq=9 Ack=9 Win=44032 Len=0 TSval=2905591296 TSecr=2905591296
3548 145.649310398 127.0.0.1 127.0.0.1 OpenFL 88 Type: OFPT_STATS_REQUEST
3549 145.649317839 127.0.0.1 127.0.0.1 TCP 68 32958 -> 6633 [ACK] Seq=9 Ack=29 Win=44032 Len=0 TSval=2905591296 TSecr=2905591296
3550 145.650272507 127.0.0.1 127.0.0.1 OpenFL 244 Type: OFPT_FEATURES_REPLY
3551 145.650290919 127.0.0.1 127.0.0.1 OpenFL 1136 Type: OFPT_STATS_REPLY
3552 145.650293694 127.0.0.1 127.0.0.1 TCP 68 6633 -> 32958 [ACK] Seq=29 Ack=1253 Win=67072 Len=0 TSval=2905591297 TSecr=2905591297
3553 145.650473480 127.0.0.1 127.0.0.1 OpenFL 80 Type: OFPT_SET_CONFIG
3557 145.691564660 127.0.0.1 127.0.0.1 TCP 68 32958 -> 6633 [ACK] Seq=1253 Ack=41 Win=44032 Len=0 TSval=2905591339 TSecr=2905591339
3558 145.691573184 127.0.0.1 127.0.0.1 OpenFL 148 Type: OFPT_BARRIER_REQUEST

Frame 3544: 76 bytes on wire (608 bits), 76 bytes captured (608 bits) on interface any, id 0
Linux cooked capture v1
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
Transmission Control Protocol, Src Port: 6633, Dst Port: 32958, Seq: 1, Ack: 1, Len: 8
OpenFlow 1.0
.000 0001 = Version: 1.0 (0x01)
Type: OFPT_HELLO (0)
Length: 8
Transaction ID: 2
```

รูปที่ 3 แพ็กเก็ต ofpt hello



รูปที่ 4 แพ็กเก็ต OFPT_PACKET_IN และ OFPT_PACKET_OUT



รูปที่ 5 แพ็กเก็ต OFPT_PACKET_IN และ OFPT_PACKET_OUT

LAB Step by step OVN Testbed using alpine containers

```

nithiroj@nithiroj-Nitro-AN515-57 ~$ for i in {1..4}; do
  sudo docker exec host1 ping -c 3 10.0.0.$i
done
PING 10.0.0.1 (10.0.0.1): 56 data bytes
64 bytes from 10.0.0.1: seq=0 ttl=64 time=0.038 ms
64 bytes from 10.0.0.1: seq=1 ttl=64 time=0.038 ms
64 bytes from 10.0.0.1: seq=2 ttl=64 time=0.040 ms

--- 10.0.0.1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.038/0.038/0.040 ms
PING 10.0.0.2 (10.0.0.2): 56 data bytes
64 bytes from 10.0.0.2: seq=0 ttl=64 time=0.228 ms
64 bytes from 10.0.0.2: seq=1 ttl=64 time=0.052 ms
64 bytes from 10.0.0.2: seq=2 ttl=64 time=0.082 ms

--- 10.0.0.2 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.052/0.120/0.228 ms
PING 10.0.0.3 (10.0.0.3): 56 data bytes
64 bytes from 10.0.0.3: seq=0 ttl=64 time=0.238 ms
64 bytes from 10.0.0.3: seq=1 ttl=64 time=0.052 ms
64 bytes from 10.0.0.3: seq=2 ttl=64 time=0.053 ms

--- 10.0.0.3 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.052/0.114/0.238 ms
PING 10.0.0.4 (10.0.0.4): 56 data bytes
64 bytes from 10.0.0.4: seq=0 ttl=64 time=0.343 ms
64 bytes from 10.0.0.4: seq=1 ttl=64 time=0.052 ms
64 bytes from 10.0.0.4: seq=2 ttl=64 time=0.055 ms

--- 10.0.0.4 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.052/0.150/0.343 ms
nithiroj@nithiroj-Nitro-AN515-57 ~$

```

รูปที่ 6 ผลการ Ping ของ host 1 ไปหา host2, host3, host4

```
nithiroj@nithiroj-Nitro-AN515-57 ~$ sudo ovn-nbctl show
switch 6450090c-5e56-4949-b00f-02510087dbb9 (ls-test)
  port lp-host1
    addresses: ["02:00:00:00:00:01 10.0.0.1/24"]
  port ln-port
    type: localnet
    addresses: ["unknown"]
  port lp-host4
    addresses: ["02:00:00:00:00:04 10.0.0.4/24"]
  port lp-host2
    addresses: ["02:00:00:00:00:02 10.0.0.2/24"]
  port lp-host3
    addresses: ["02:00:00:00:00:03 10.0.0.3/24"]
nithiroj@nithiroj-Nitro-AN515-57 ~$
```

รูปที่ 7 sudo ovn-nbctl show

```
nithiroj@nithiroj-Nitro-AN515-57 ~$ sudo ovn-sbctl show
Chassis ovs-host
  hostname: nithiroj-Nitro-AN515-57
  Encap geneve
    ip: "127.0.0.1"
    options: {csum="true"}
nithiroj@nithiroj-Nitro-AN515-57 ~$
```

รูปที่ 8 sudo ovn-sbctl show

```

nithiroj@nithiroj-Nitro-AN515-57 ~$ sudo ovs-vsctl show
8af89a25-d1e5-40d5-8d8b-c22babcb5957
    Bridge br-int
        fail_mode: secure
        datapath_type: system
    Port br-int
        Interface br-int
            type: internal
    Bridge br-ovs2
    Port patch-ovs2-to-ovs1
        Interface patch-ovs2-to-ovs1
            type: patch
            options: {peer=patch-ovs1-to-ovs2}
    Port br-ovs2
        Interface br-ovs2
            type: internal
    Port veth4
        Interface veth4
    Port veth3
        Interface veth3
    Bridge br-ovs1
    Port patch-ovs1-to-ovs2
        Interface patch-ovs1-to-ovs2
            type: patch
            options: {peer=patch-ovs2-to-ovs1}
    Port veth1
        Interface veth1
    Port br-ovs1
        Interface br-ovs1
            type: internal
    Port veth2
        Interface veth2
    ovs_version: "3.3.4"
nithiroj@nithiroj-Nitro-AN515-57 ~$

```

รูปที่ 9 sudo ovs-vsctl show

```

nithiroj@nithiroj-Nitro-AN515-57 ~$ sudo ovs-ofctl dump-flows br-ovs1
cookie=0x0, duration=514.965s, table=0, n_packets=141, n_bytes=11094, priority=0 actions=NORMAL
nithiroj@nithiroj-Nitro-AN515-57 ~$

```

รูปที่ 10 sudo ovs-ofctl dump-flows br-ovs1