Lab4

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1

My VMs' address is shown below.

VM1: 192.168.56.103

VM2: 192.168.56.104

The two commands we should add are:

```
sudo ovs-vsctl add-port s1 vxlan0 -- set interface vxlan0 type=vxlan
options:remote_ip=192.168.56.104
```

```
sudo ovs-vsctl add-port s2 vxlan0 -- set interface vxlan0 type=vxlan
options:remote_ip=192.168.56.103
```

From Figure1, we can see that 10.0.0.1 can connect to 10.0.0.2.

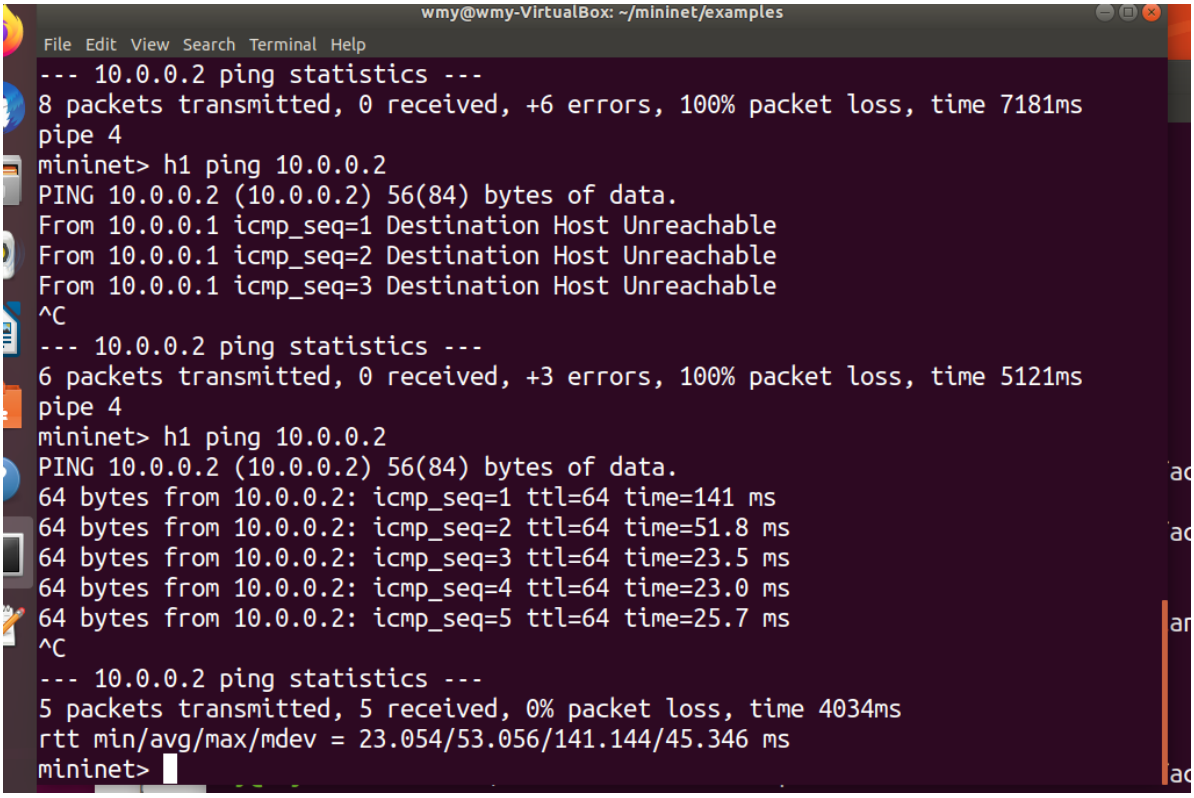
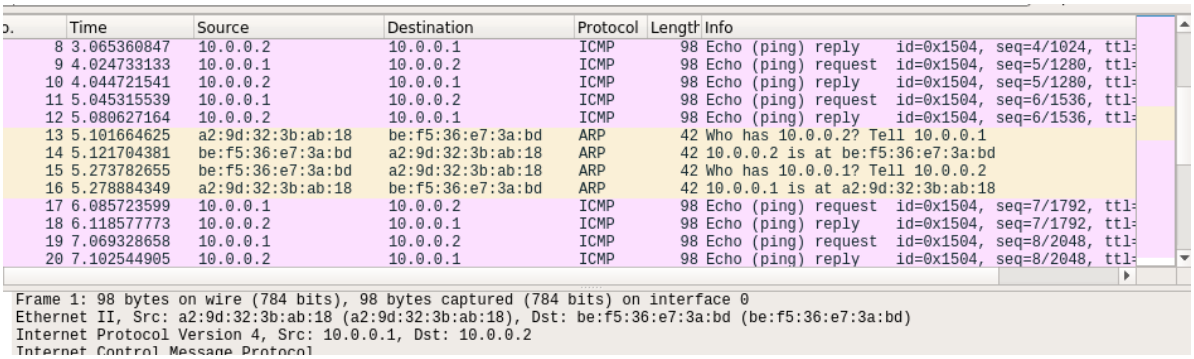


Figure 1

2

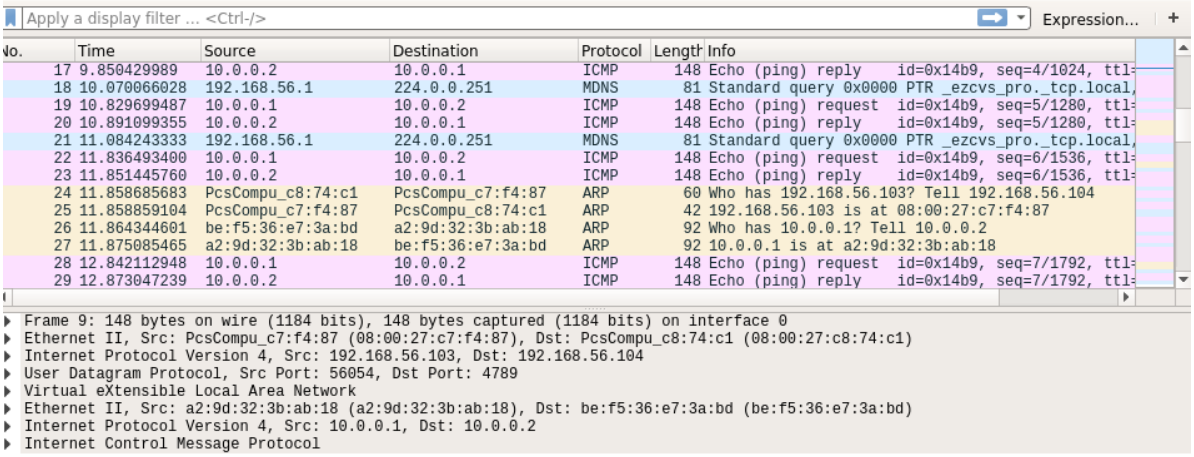
Using Wireshark to monitor the interfaces s1 and enp0s8, we can know that VXLAN uses ICMP and ARP.



No.	Time	Source	Destination	Protocol	Length	Info
8	3.065360847	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x1504, seq=4/1024, ttl=
9	4.024733133	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x1504, seq=5/1280, ttl=
10	4.044721541	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x1504, seq=5/1280, ttl=
11	5.045315539	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x1504, seq=6/1536, ttl=
12	5.080627164	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x1504, seq=6/1536, ttl=
13	5.101664625	a2:9d:32:3b:ab:18	be:f5:36:e7:3a:bd	ARP	42	Who has 10.0.0.2? Tell 10.0.0.1
14	5.121704381	be:f5:36:e7:3a:bd	a2:9d:32:3b:ab:18	ARP	42	10.0.0.2 is at be:f5:36:e7:3a:bd
15	5.273782655	be:f5:36:e7:3a:bd	a2:9d:32:3b:ab:18	ARP	42	Who has 10.0.0.1? Tell 10.0.0.2
16	5.278884349	a2:9d:32:3b:ab:18	be:f5:36:e7:3a:bd	ARP	42	10.0.0.1 is at a2:9d:32:3b:ab:18
17	6.085723599	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x1504, seq=7/1792, ttl=
18	6.118577773	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x1504, seq=7/1792, ttl=
19	7.069328658	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x1504, seq=8/2048, ttl=
20	7.102544905	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x1504, seq=8/2048, ttl=

```
Frame 1: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0
Ethernet II, Src: a2:9d:32:3b:ab:18 (a2:9d:32:3b:ab:18), Dst: be:f5:36:e7:3a:bd (be:f5:36:e7:3a:bd)
Internet Protocol Version 4, Src: 10.0.0.1, Dst: 10.0.0.2
Internet Control Message Protocol
```

Figure2: Monitoring s1



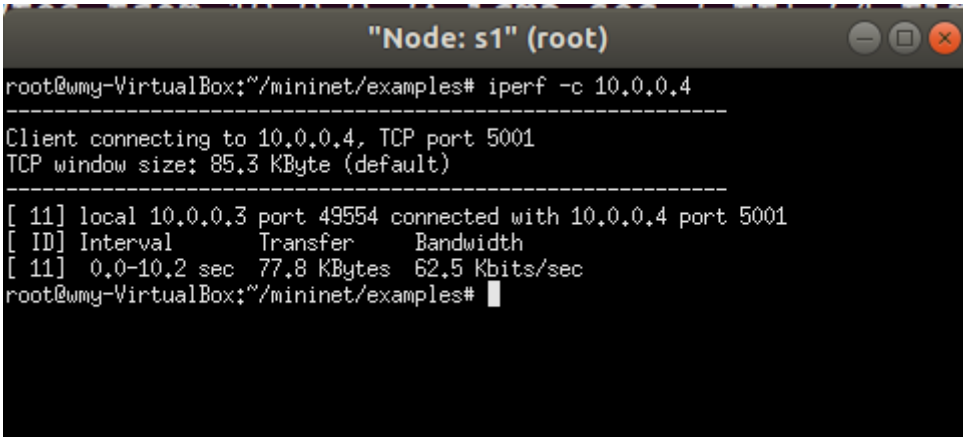
Apply a display filter ... <Ctrl-/> Expression... +

No.	Time	Source	Destination	Protocol	Length	Info
17	9.850429989	10.0.0.2	10.0.0.1	ICMP	148	Echo (ping) reply id=0x14b9, seq=4/1024, ttl=
18	10.070066028	192.168.56.1	224.0.0.251	MDNS	81	Standard query 0x0000 PTR _ezcvs_pro._tcp.local,
19	10.829699487	10.0.0.1	10.0.0.2	ICMP	148	Echo (ping) request id=0x14b9, seq=5/1280, ttl=
20	10.891099355	10.0.0.2	10.0.0.1	ICMP	148	Echo (ping) reply id=0x14b9, seq=5/1280, ttl=
21	11.084243333	192.168.56.1	224.0.0.251	MDNS	81	Standard query 0x0000 PTR _ezcvs_pro._tcp.local,
22	11.836493400	10.0.0.1	10.0.0.2	ICMP	148	Echo (ping) request id=0x14b9, seq=6/1536, ttl=
23	11.851445760	10.0.0.2	10.0.0.1	ICMP	148	Echo (ping) reply id=0x14b9, seq=6/1536, ttl=
24	11.858685683	PcsCompu_c8:74:c1	PcsCompu_c7:f4:87	ARP	60	Who has 192.168.56.103? Tell 192.168.56.104
25	11.858859104	PcsCompu_c7:f4:87	PcsCompu_c8:74:c1	ARP	42	192.168.56.103 is at 08:00:27:c7:f4:87
26	11.864344601	be:f5:36:e7:3a:bd	a2:9d:32:3b:ab:18	ARP	92	Who has 10.0.0.1? Tell 10.0.0.2
27	11.875085465	a2:9d:32:3b:ab:18	be:f5:36:e7:3a:bd	ARP	92	10.0.0.1 is at a2:9d:32:3b:ab:18
28	12.842112948	10.0.0.1	10.0.0.2	ICMP	148	Echo (ping) request id=0x14b9, seq=7/1792, ttl=
29	12.873047239	10.0.0.2	10.0.0.1	ICMP	148	Echo (ping) reply id=0x14b9, seq=7/1792, ttl=

```
▸ Frame 9: 148 bytes on wire (1184 bits), 148 bytes captured (1184 bits) on interface 0
▸ Ethernet II, Src: PcsCompu_c7:f4:87 (08:00:27:c7:f4:87), Dst: PcsCompu_c8:74:c1 (08:00:27:c8:74:c1)
▸ Internet Protocol Version 4, Src: 192.168.56.103, Dst: 192.168.56.104
▸ User Datagram Protocol, Src Port: 56054, Dst Port: 4789
▸ Virtual eXtensible Local Area Network
▸ Ethernet II, Src: a2:9d:32:3b:ab:18 (a2:9d:32:3b:ab:18), Dst: be:f5:36:e7:3a:bd (be:f5:36:e7:3a:bd)
▸ Internet Protocol Version 4, Src: 10.0.0.1, Dst: 10.0.0.2
▸ Internet Control Message Protocol
```

Figure 3: Monitoring enp0s8

3



"Node: s1" (root)

```
root@wmy-VirtualBox:~/mininet/examples# iperf -c 10.0.0.4
------------------------------------------------------------
Client connecting to 10.0.0.4, TCP port 5001
TCP window size: 85.3 KByte (default)
------------------------------------------------------------
[ 11] local 10.0.0.3 port 49554 connected with 10.0.0.4 port 5001
[ ID] Interval       Transfer     Bandwidth
[ 11]  0.0-10.2 sec  77.8 KBytes  62.5 Kbits/sec
root@wmy-VirtualBox:~/mininet/examples#
```

Figure 4

From figure4, we can know that the bandwidth is about 62.5kbps. It's too small and it's probably caused by the limited MTU size.

4

4.1

We can designate the MTU size of iperf3 by `iperf -c 10.0.0.4 -M 1000`, we can learn from figure 5 that the bandwidth is improved to 2.5Gps.

This command attempt to set the TCP maximum segment size (MSS). The MSS is usually the MTU - 40 bytes for the TCP/IP header. But this time we have to spend 50 bytes for VXLAN, so we should set it to be smaller than 1410.

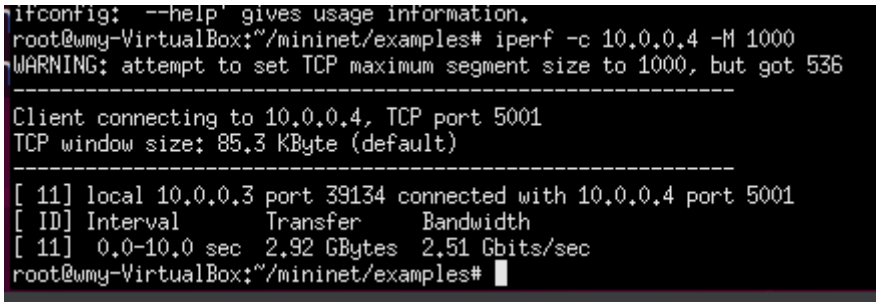


Figure 5

4.2

We can designate the MTU of the two enp0s8 interfaces by the command `sudo ip link set mtu <MTU-SIZE> dev enp0s8`, and we set it to be 9000.

From Figure 7 we can see that the Bandwidth is improved to 3.8Gps.

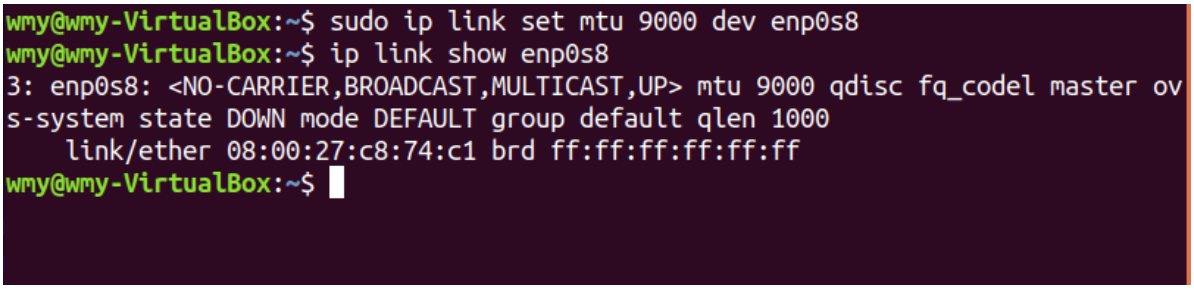


Figure 6

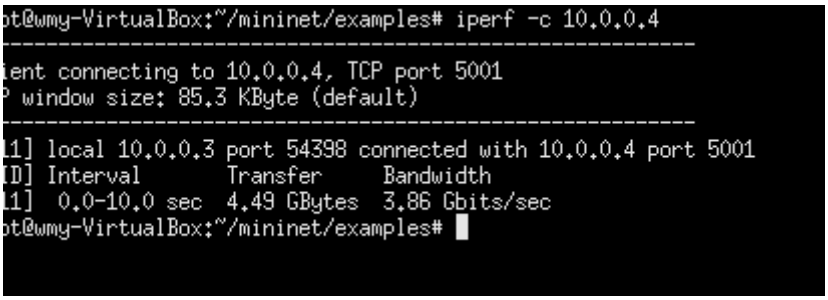


Figure 7