CS339 Lab7 VXLAN

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Question 1

64	21.815791180	192.168.234.129	192.168.234.2	DNS	100 Standard
65	21.822108038	192.168.234.2	192.168.234.129	DNS	161 Standard
66	21.823493554	192.168.234.129	192.168.234.2	DNS	112 Standard
67	21.825436495	192.168.234.2	192.168.234.129	DNS	187 Standard
68	21.826026463	192.168.234.129	192.168.234.2	DNS	101 Standard
69	21.835364379	192.168.234.2	192.168.234.129	DNS	176 Standard
70	22.068516798	10.0.0.2	10.0.0.3	ICMP	148 Echo (pi
71	22.070586261	10.0.0.3	10.0.0.2	ICMP	148 Echo (pi
72	23.070124692	10.0.0.2	10.0.0.3	ICMP	148 Echo (pi
73	23.070975699	10.0.0.3	10.0.0.2	ICMP	148 Echo (pi
74	23.218211318	VMware_c0:00:08	Broadcast	ARP	60 Who has
75	24.025837823	VMware_c0:00:08	Broadcast	ARP	60 Who has
76	24.073193542	10.0.0.2	10.0.0.3	ICMP	148 Echo (pi
77	24.075774512	10.0.0.3	10.0.0.2	ICMP	148 Echo (pi
78	25.035494829	VMware_c0:00:08	Broadcast	ARP	60 Who has

As shown in the screen shot above, the `wireshark` running on `vm1` caught three kinds of packages during the communication between `10.0.0.1` and `10.0.0.3`, i.e. two `vm hosts`. They are `ICMP, ARP` and `DNS`.

Question 2

The bandwidth between `vm1` and `vm2` is shown in the following figure

```
haoquan2@haoquan2-virtual-machine:~$ iperf -c 192.168.234.128
------------------------------------------------------------
Client connecting to 192.168.234.128, TCP port 5001
TCP window size:  578 KByte (default)
------------------------------------------------------------
[  3] local 192.168.234.129 port 57124 connected with 192.168.234.128 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.0 sec  1.74 GBytes  1.49 Gbits/sec
```

We can see that the bandwidth between the two `vm`s is `1.49 Gbits/sec`.

Then we test the connection bandwidth between two hosts in different `vm` respectively, the result is shown in the following figure

```
mininet> h2 iperf -c  10.0.0.1
------------------------------------------------------------
Client connecting to 10.0.0.1, TCP port 5001
TCP window size: 85.3 KByte (default)
------------------------------------------------------------
[  3] local 10.0.0.4 port 45550 connected with 10.0.0.1 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.3 sec  77.8 KBytes  61.7 Kbits/sec
mininet> h1 iperf -c 10.0.0.2
------------------------------------------------------------
Client connecting to 10.0.0.2, TCP port 5001
TCP window size: 85.3 KByte (default)
------------------------------------------------------------
[  3] local 10.0.0.3 port 56792 connected with 10.0.0.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.1 sec  77.8 KBytes  62.9 Kbits/sec
```

We can see that the bandwidth between `10.0.0.1` and `10.0.0.4` is `61.7 Kbits/sec` and the bandwidth between `10.0.0.2` and `10.0.0.3` is `62.9 Kbits/sec`.

About the difference

We can see that the bandwidth between two `vm`s are much faster than the bandwidth between two hosts in different `vm`s. The reason for this difference might be that after adding the `VXLAN` header to the original Ethernet frame, the total length of the packet already exceeds the default 1514 byte MTU,. Then the best practice is to implement jumbo frames throughout the network, but the result is the bandwidth between hosts will drop dramatically. Meanwhile, the connection between the `vm`s are just basic connection based on `IP` addresses and will not affected by this change.

Question 3

The connection between the hosts through `VXLAN` is shown below

```
PING 10.0.0.3 (10.0.0.3) 56(84) bytes of data.
64 bytes from 10.0.0.3: icmp_seq=1 ttl=64 time=5.56 ms
64 bytes from 10.0.0.3: icmp_seq=2 ttl=64 time=12.2 ms
64 bytes from 10.0.0.3: icmp_seq=3 ttl=64 time=2.51 ms
64 bytes from 10.0.0.3: icmp_seq=4 ttl=64 time=2.57 ms
64 bytes from 10.0.0.3: icmp_seq=5 ttl=64 time=1.27 ms
64 bytes from 10.0.0.3: icmp_seq=6 ttl=64 time=2.33 ms
^C
--- 10.0.0.3 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5010ms
rtt min/avg/max/mdev = 1.270/4.399/12.162/3.710 ms
```

The average latency is about `4.40 ms`.

While the connection between two hosts is shown below

```
PING 192.168.234.129 (192.168.234.129) 56(84) bytes of data.
64 bytes from 192.168.234.129: icmp_seq=1 ttl=64 time=1.24 ms
64 bytes from 192.168.234.129: icmp_seq=2 ttl=64 time=0.586 ms
64 bytes from 192.168.234.129: icmp_seq=3 ttl=64 time=0.748 ms
64 bytes from 192.168.234.129: icmp_seq=4 ttl=64 time=0.629 ms
64 bytes from 192.168.234.129: icmp_seq=5 ttl=64 time=0.725 ms
^C
--- 192.168.234.129 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4038ms
rtt min/avg/max/mdev = 0.586/0.784/1.235/0.232 ms
```

The average latency is about `0.78 ms`, which is much faster than the previous connection through `VXLAN`.

About the difference

This difference is actually due to the same reason as we discussed before. Since the packet used for `VXLAN` is much bigger than the original Ethernet packet, it will cost a lot of extra time to transmit the packet. It even needs break the packet down and transmit them, which may also cost a lot of extra time.