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Computer Network Lab2 Report   2021-10-07

1 Introduction

This lab is set for us to learn some basic usage of mininet and acquire a further understanding of computer network. To finish the lab, we need to read the code provided in the mininet's examples folder.

2 Question 1

This question requires us to create a simple topo network based on the given network. To solve this problem, we first need to create some hosts and switches. Then we need to use function addLink to link them together. Note that we need to specify the bandwidth between (s1,s2) and (s1,s3) as 10Mbps by setting bw=10.
Do not forget to set the link=TCLink. Otherwise the link will not work. Figure 1 is the result of the Iperf test.

```
c0
s1 lo:  s1-eth1:h1-eth0 s1-eth2:s2-eth2 s1-eth3:s3-eth2
s2 lo:  s2-eth1:h2-eth0 s2-eth2:s1-eth2
s3 lo:  s3-eth1:h3-eth0 s3-eth2:s1-eth3
h1 h1-eth0:s1-eth1
h2 h2-eth0:s2-eth1
h3 h3-eth0:s3-eth1
*** Iperf: testing TCP bandwidth between h1 and h3
*** Results: ['6.42 Mbits/sec', '7.30 Mbits/sec']
*** Iperf: testing TCP bandwidth between h2 and h3
*** Results: ['5.96 Mbits/sec', '6.24 Mbits/sec']
*** Iperf: testing TCP bandwidth between h1 and h2
*** Results: ['9.20 Mbits/sec', '9.76 Mbits/sec']
*** Starting CLI:
```

Figure 1: TCP Throughput between Each Host when Bandwidth=10Mbps

3 Question 2

This question is asked based on the question 1. It requires us to set the packet loss rate as 5%. Simply, we only need to set the parameter loss in the function addLink to 5 and we can reach the goal. Figure 2 is the result of the Iperf test.

```
c0
s1 lo:  s1-eth1:h1-eth0 s1-eth2:s2-eth2 s1-eth3:s3-eth2
s2 lo:  s2-eth1:h2-eth0 s2-eth2:s1-eth2
s3 lo:  s3-eth1:h3-eth0 s3-eth2:s1-eth3
h1 h1-eth0:s1-eth1
h2 h2-eth0:s2-eth1
h3 h3-eth0:s3-eth1
*** Iperf: testing TCP bandwidth between h1 and h3
*** Results: ['6.07 Mbits/sec', '6.20 Mbits/sec']
*** Iperf: testing TCP bandwidth between h2 and h3
*** Results: ['1.92 Mbits/sec', '1.99 Mbits/sec']
*** Iperf: testing TCP bandwidth between h1 and h2
*** Results: ['3.53 Mbits/sec', '3.60 Mbits/sec']
*** Starting CLI:
```

Figure 2: TCP Throughput between Each Host when Bandwidth=10Mbps and Loss Rate=5%

4 Question 3

This question asks us to add a link between s2 and s3 so that there will be a loop among s1, s2 and s3. Since there is a loop in the net, the message cannot be sent from a host to another. Therefore, we need to add some new flow rules to solve this problem.

Intuitively, I think I should add a new road between each host so that the hosts can send message on the new road. However it does not work. When using command pingall, the priority of the flow created by pingall is the highest.

From another aspect to consider the question, I consider that I can add new rules to forbid the sending between s2 and s2. Then the loop will disappear and each host can successfully ping each other.

```
c0
s1 lo:  s1-eth1:h1-eth0 s1-eth2:s2-eth2 s1-eth3:s3-eth2
s2 lo:  s2-eth1:h2-eth0 s2-eth2:s1-eth2 s2-eth3:s3-eth3
s3 lo:  s3-eth1:h3-eth0 s3-eth2:s1-eth3 s3-eth3:s2-eth3
h1 h1-eth0:s1-eth1
h2 h2-eth0:s2-eth1
h3 h3-eth0:s3-eth1
*** Starting CLI:
mininet> pingall
*** Ping: testing ping reachability
h1 -> X X
h2 -> X X
h3 -> X X
*** Results: 100% dropped (0/6 received)
```

Figure 3: basic information of the network

Reading the topo structure of the network shown in Figure 3, we can see that s2 communicate with s3 at port 3 and s3 communicate with s2 at port 3 as well. Therefore, I drop the message sent between them by using the command shown below.

```
samliu@samliu-VirtualBox:~$ sudo ovs-ofctl -O Openflow13 add-flow s2 in_port=3,actions=drop
[sudo] samliu 的密码:
samliu@samliu-VirtualBox:~$ sudo ovs-ofctl -O Openflow13 add-flow s3 in_port=3,actions=drop
```

Figure 4: drop flow command

After using the command, each host can successfully ping with each other.

```
mininet> pingall
*** Ping: testing ping reachability
h1 -> X X
h2 -> X X
h3 -> X X
*** Results: 100% dropped (0/6 received)
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3
h2 -> h1 h3
h3 -> h1 h2
*** Results: 0% dropped (6/6 received)
```

Figure 5: ping result after dropping flow

5 Conclusion

In this lab, I learn how to create a simple mininet by adding switches, hosts, roots and links among them. I know how to set the bandwidth, loss rate, and other parameters of the link. Most importantly, I learn how to add new flow rules based on the topo structure of the mininet and how do different rules impact on the network.

In conclusion, it is a fruitful lab for me!