Lab4

1.Show the ping results to test reachability

```
mininet> h1 ping GWr -c 5
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=0.124 ms
64 bytes from 10.0.0.3: icmp_seq=2 ttl=64 time=0.095 ms
64 bytes from 10.0.0.3: icmp_seq=3 ttl=64 time=0.163 ms
64 bytes from 10.0.0.3: icmp_seq=4 ttl=64 time=0.088 ms
64 bytes from 10.0.0.3: icmp_seq=5 ttl=64 time=0.254 ms

--- 10.0.0.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4090ms
```

```
mininet> h2 ping GWr -c 5
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=0.219 ms
64 bytes from 10.0.0.3: icmp_seq=2 ttl=64 time=0.104 ms
64 bytes from 10.0.0.3: icmp_seq=3 ttl=64 time=0.152 ms
64 bytes from 10.0.0.3: icmp_seq=4 ttl=64 time=0.137 ms
64 bytes from 10.0.0.3: icmp_seq=5 ttl=64 time=0.126 ms

--- 10.0.0.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4088ms
rtt min/avg/max/mdev = 0.104/0.147/0.219/0.041 ms
```

2.Show all interfaces of Node BRGr after h1 and h2 can ping GWr

```
root@potatofarm-VirtualBox:~/Downloads/lab4# ./main
0 Name: BRGr-eth0
1 Name: br0
2 Name: BRGr-eth1
3 Name: GRE1
4 Name: GRE2
5 Name: GRE3
6 Name: any
7 Name: lo
8 Name: nflog
9 Name: nfqueue
10 Name: usbmon1
```

3.Draw the interconnection diagram of interfaces and Linux bridge on BRGr. Explain your diagram with the screenshot of interface list of BRGr.
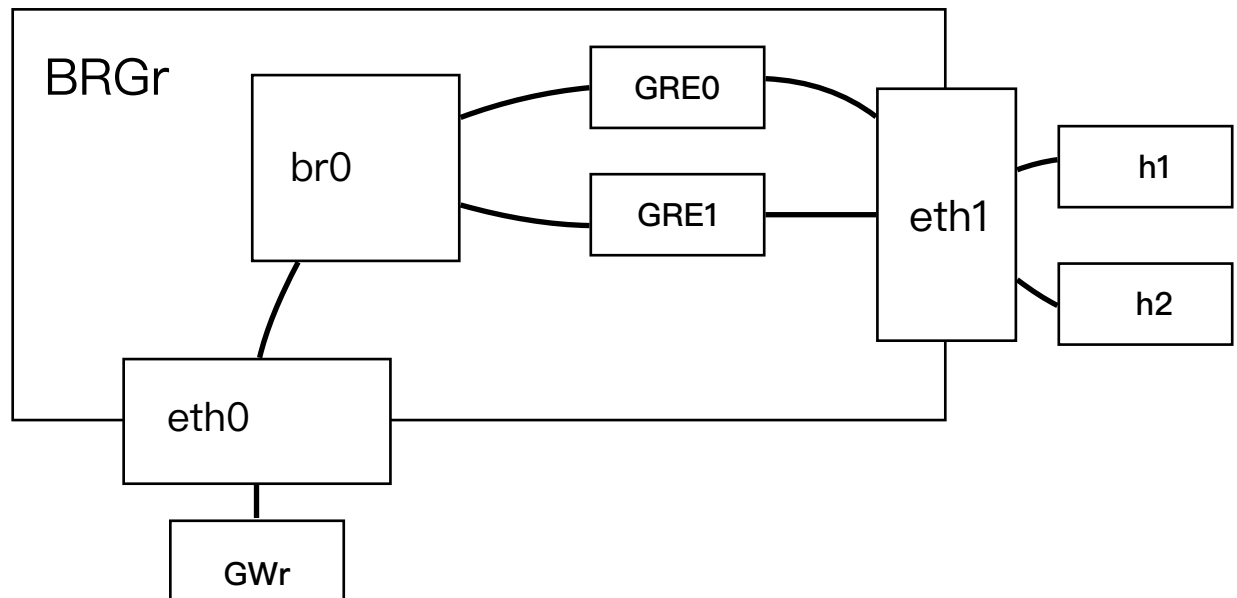
Gwr的封包先傳到BRGr的eth0，根據br0的mac addr資料以適當的gretap(GRE0 or GRE1)，在經由eth1傳到h1 or h2反之同理

4.Explain how Linux kernel of BRGr determines which gretap interface to forward packets from GWr to hosts (h1 or h2)?
Describe your answer with appropriate screenshot.

```
root@potatofarm-VirtualBox:~/Downloads/lab4# brctl showmacs br0
port no  mac addr            is local?       ageing timer
  3      0e:d9:76:0b:bf:b5   yes             0.00
  3      0e:d9:76:0b:bf:b5   yes             0.00
  2      12:cb:a1:43:37:c2   no              64.55
  2      12:d6:ad:32:41:f5   yes             0.00
  2      12:d6:ad:32:41:f5   yes             0.00
  4      46:bd:30:49:95:e2   yes             0.00
  4      46:bd:30:49:95:e2   yes             0.00
  2      ae:c5:98:5a:fd:31   no              31.78
  1      ca:b3:9a:02:49:ca   no              31.78
  1      ce:70:05:f7:90:34   yes             0.00
  1      ce:70:05:f7:90:34   yes             0.00
```

Ans:

br0 的 mac table會存之前封包傳過來的 ip address，再根據這個table決定哪種 greatap

5.Run tcpdump on h1 to capture packet and take screenshot to explain why or why not h1 is aware of GRE tunneling.

Ans:

因為h1有收到ICMP reply(Type = 0)，代表此時GRE tunnel已經接通，可以開始傳輸，相反的，如果h1一直沒有收到ICMP reply(其他多為Type = 133)，因此h1是可以知道GRE tunnel是否有建成的