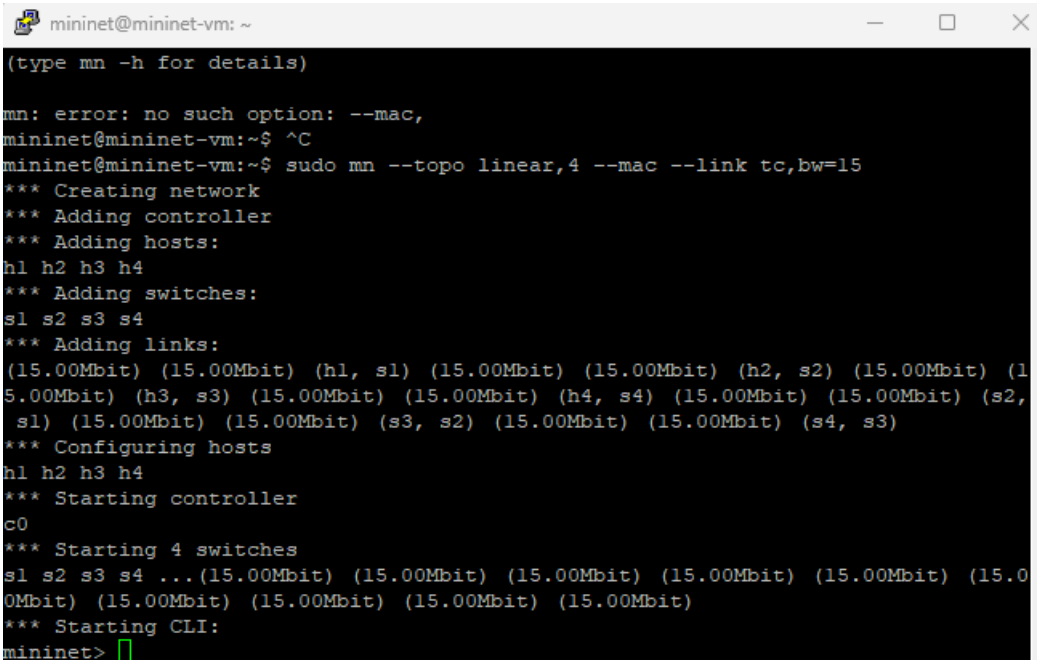
Trabalho Mininet

Adcionando IP na porta eth1 para abrir conexão com o putty:

sudo ifconfig eth1 192.168.56.101 netmask 255.255.255.0 up

A-) Criando a topologia linear com 4 host, mac padronizado e largura de banda de 15Mbps

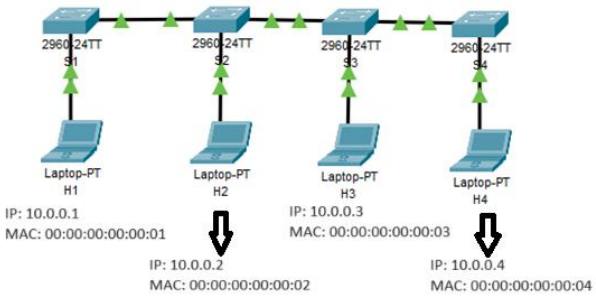
sudo mn --topo linear,4 --mac --link tc,bw=15



B-) Verificação de MAC, IP: h1 ifconfig -a, h2 ifconfig -a, h3 ifconfig -a e h4 ifconfig -a

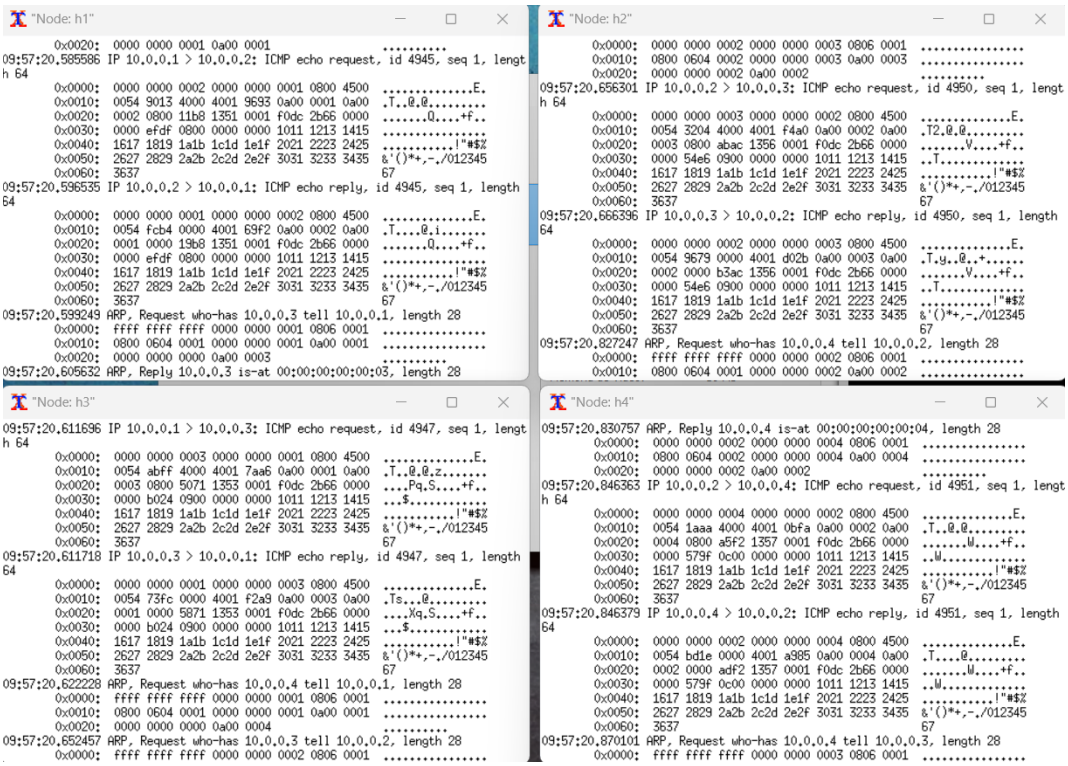
```
mininet@mininet-vm: ~
mininet> h1 ifconfig -a
h1-eth0   Link encap:Ethernet  HWaddr 00:00:00:00:00:01
          inet addr:10.0.0.1  Bcast:10.255.255.255  Mask:255.0.0.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

mininet> h2 ifconfig -a
h2-eth0   Link encap:Ethernet  HWaddr 00:00:00:00:00:02
          inet addr:10.0.0.2  Bcast:10.255.255.255  Mask:255.0.0.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

mininet> h3 ifconfig -a
h3-eth0   Link encap:Ethernet  HWaddr 00:00:00:00:00:03
          inet addr:10.0.0.3  Bcast:10.255.255.255  Mask:255.0.0.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

mininet> h4 ifconfig -a
h4-eth0   Link encap:Ethernet  HWaddr 00:00:00:00:00:04
          inet addr:10.0.0.4  Bcast:10.255.255.255  Mask:255.0.0.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
```

C-) Desenho ilustrativo da topologia



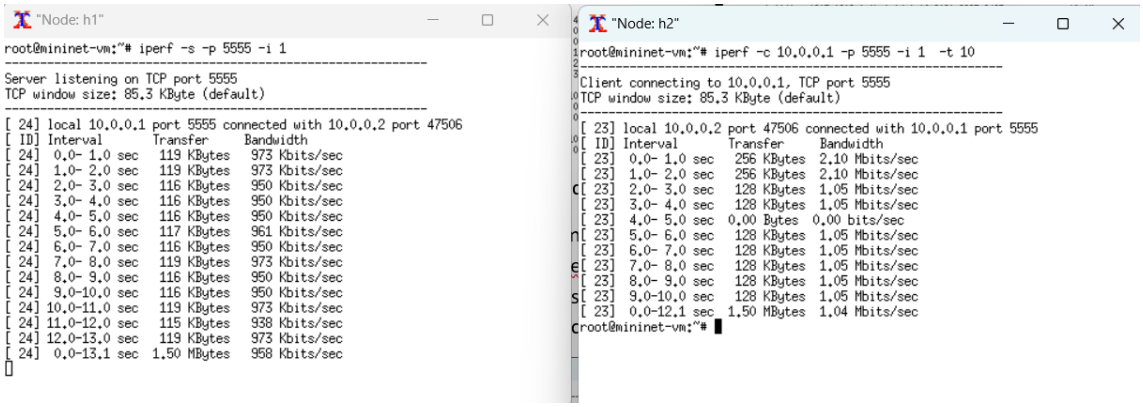
D-) Teste de ping entres os nós

```
mininet@mininet-vm: ~
h1 h2 h3 h4
*** Adding switches:
s1 s2 s3 s4
*** Adding links:
(15.00Mbit) (15.00Mbit) (h1, s1) (15.00Mbit) (15.00Mbit) (h2, s2) (15.00Mbit) (15.00
Mbit) (h3, s3) (15.00Mbit) (15.00Mbit) (h4, s4) (15.00Mbit) (15.00Mbit) (s2, s1) (15
.00Mbit) (15.00Mbit) (s3, s2) (15.00Mbit) (15.00Mbit) (s4, s3)
*** Configuring hosts
h1 h2 h3 h4
*** Starting controller
c0
*** Starting 4 switches
s1 s2 s3 s4 ...(15.00Mbit) (15.00Mbit) (15.00Mbit) (15.00Mbit) (15.00Mbit) (15.00Mbi
t) (15.00Mbit) (15.00Mbit) (15.00Mbit) (15.00Mbit)
*** Starting CLI:
mininet> xterm h1 h2 h3 h4
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 h4
h2 -> h1 h3 h4
h3 -> h1 h2 h4
h4 -> h1 h2 h3
*** Results: 0% dropped (12/12 received)
mininet>
```



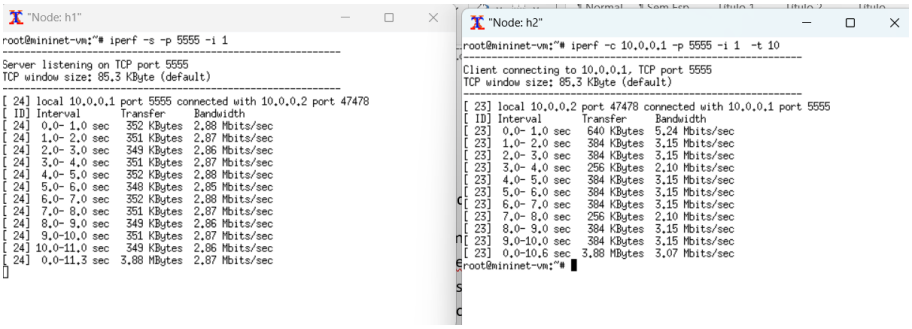
E-) Teste iperf de 10s com banda de 1Mbps

- Criando a topologia com 1Mbps: sudo mn --topo linear,4 --mac --link tc,bw=1
- Abrindo os terminais xterm: xterm h1 h2
- Configurando h1 como servidor com 10s de intervalo: iperf -s -p 5555 -i 10
- Configurando h2 como cliente: iperf -c 10.0.0.1 -p 5555 -i 1 -t 10



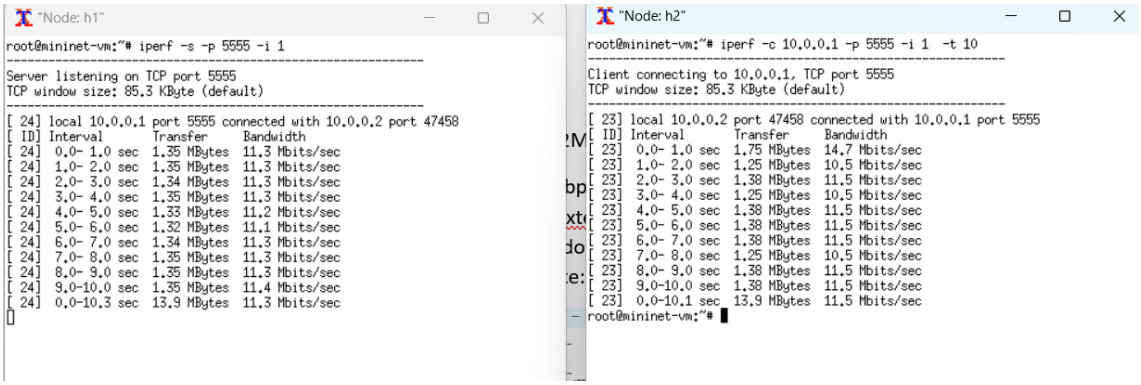
F-) Teste iperf de 10s com banda de 3Mbps

- Criando a topologia com 1Mbps: sudo mn --topo linear,4 --mac --link tc,bw=3
- Abrindo os terminais xterm: xterm h1 h2
- Configurando h1 como servidor com 10s de intervalo: iperf -s -p 5555 -i 1
- Configurando h2 como cliente: iperf -c 10.0.0.1 -p 5555 -i 1 -t 10



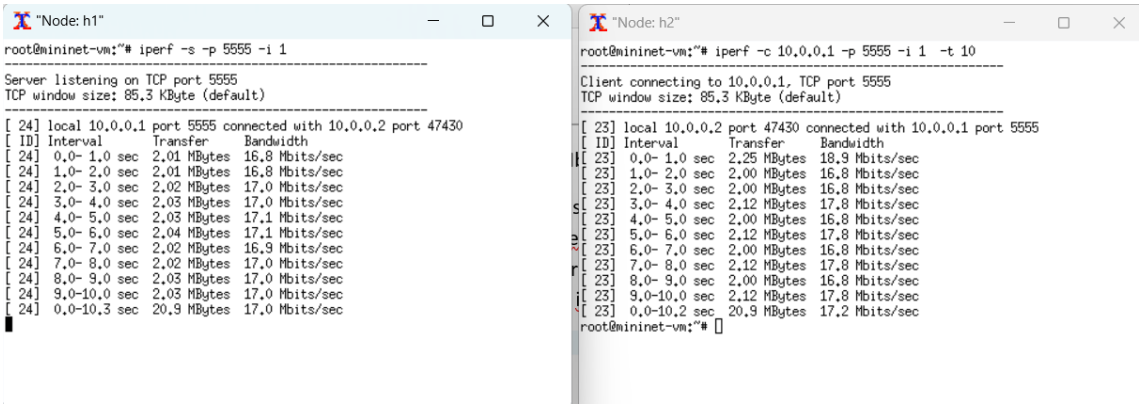
F-) Teste iperf de 10s com banda de 12Mbps

- Criando a topologia com 1Mbps: sudo mn --topo linear,4 --mac --link tc,bw=12
- Abrindo os terminais xterm: xterm h1 h2
- Configurando h1 como servidor com 10s de intervalo: iperf -s -p 5555 -i 1
- Configurando h2 como cliente: iperf -c 10.0.0.1 -p 5555 -i 1 -t 10



F-) Teste iperf de 10s com banda de 18Mbps

- Criando a topologia com 1Mbps: sudo mn --topo linear,4 --mac --link tc,bw=18
- Abrindo os terminais xterm: xterm h1 h2
- Configurando h1 como servidor com 10s de intervalo: iperf -s -p 5555 -i 1
- Configurando h2 como cliente: iperf -c 10.0.0.1 -p 5555 -i 1 -t 10



Deletar uma topologia existente:

sudo mn -c

2 -) Criar uma topologia em python para o desenho ilustrado

Link do GitHub: Trabalhos-Inatel/C115-Dispositivos_Conectados/Trabalho_Mininet at main · Jonathan-Stefan/Trabalhos-Inatel (github.com)

A-) Criando a topologia customizada:

sudo mn --custom topo_5switches_6hosts.py --topo mytopo

b-) Inspeção das portas, endereços IP e MAC:

```
mininet> net
h1 h1-eth0:s1-eth1
h2 h2-eth0:s2-eth2
h3 h3-eth0:s4-eth2
h4 h4-eth0:s4-eth3
h5 h5-eth0:s5-eth2
h6 h6-eth0:s5-eth3
s1 lo:  s1-eth1:h1-eth0 s1-eth2:s2-eth1
s2 lo:  s2-eth1:s1-eth2 s2-eth2:h2-eth0 s2-eth3:s3-eth1
s3 lo:  s3-eth1:s2-eth3 s3-eth2:s4-eth1 s3-eth3:s5-eth1
s4 lo:  s4-eth1:s3-eth2 s4-eth2:h3-eth0 s4-eth3:h4-eth0
s5 lo:  s5-eth1:s3-eth3 s5-eth2:h5-eth0 s5-eth3:h6-eth0
c0
```

```
mininet> h1 ifconfig -a
h1-eth0   Link encap:Ethernet  HWaddr 00:00:00:00:00:01
          inet addr:192.168.0.1  Bcast:192.168.0.15  Mask:255.255.255.240
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

```
mininet> h2 ifconfig -a
h2-eth0   Link encap:Ethernet  HWaddr 00:00:00:00:00:02
          inet addr:192.168.0.2  Bcast:192.168.0.15  Mask:255.255.255.240
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

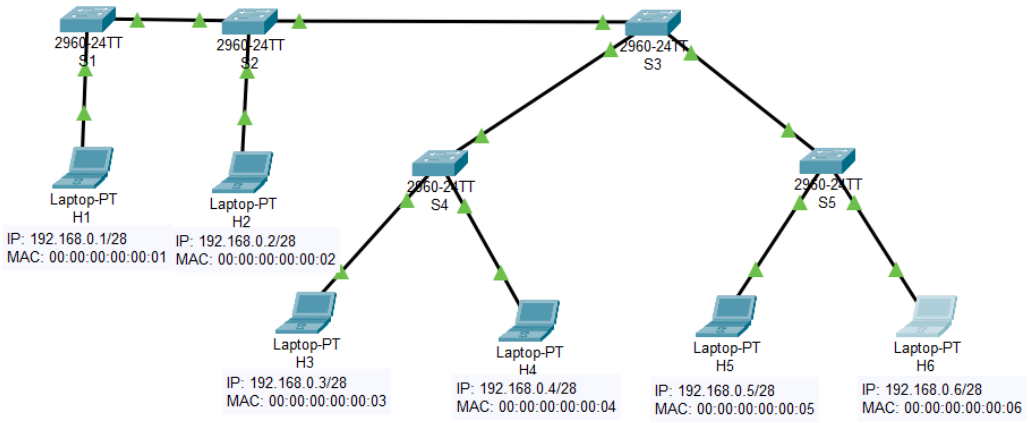
```
mininet> h3 ifconfig -a
h3-eth0   Link encap:Ethernet  HWaddr 00:00:00:00:00:03
          inet addr:192.168.0.3  Bcast:192.168.0.15  Mask:255.255.255.240
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

```
mininet> h4 ifconfig -a
h4-eth0   Link encap:Ethernet  HWaddr 00:00:00:00:00:04
          inet addr:192.168.0.4  Bcast:192.168.0.15  Mask:255.255.255.240
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

```
mininet> h5 ifconfig -a
h5-eth0   Link encap:Ethernet  HWaddr 00:00:00:00:00:05
          inet addr:192.168.0.5  Bcast:192.168.0.15  Mask:255.255.255.240
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

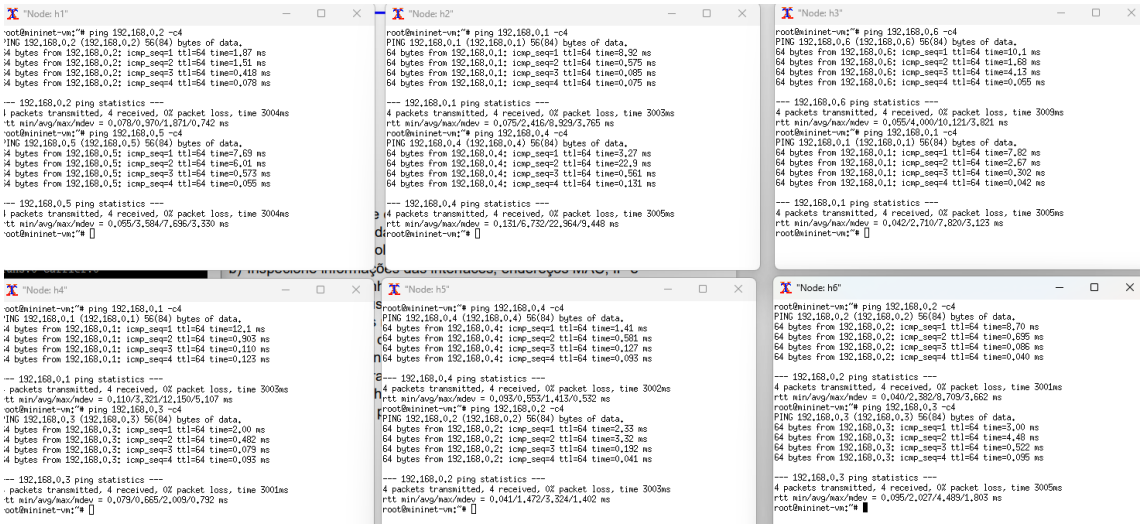
```
mininet> h6 ifconfig -a
h6-eth0   Link encap:Ethernet  HWaddr 00:00:00:00:00:06
          inet addr:192.168.0.6  Bcast:192.168.0.15  Mask:255.255.255.240
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

C-) Desenho da topologia com as informações obtidas

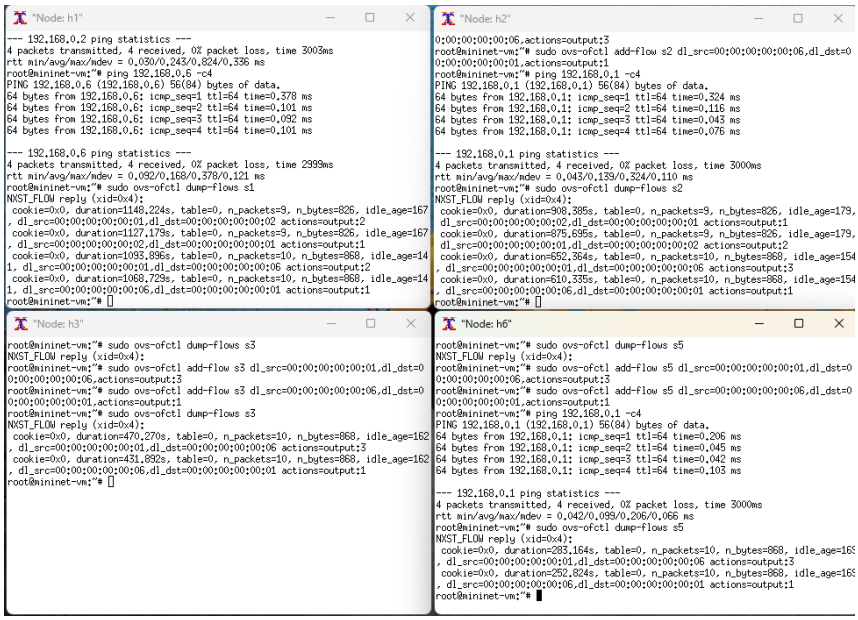


D-) Teste de pings com os switches normais

```
mininet@mininet-vm: ~

*** Ping: testing ping reachability
h1 -> h2 h3 h4 h5 h6
h2 -> h1 h3 h4 h5 h6
h3 -> h1 h2 h4 h5 h6
h4 -> h1 h2 h3 h5 h6
h5 -> h1 h2 h3 h4 h6
h6 -> h1 h2 h3 h4 h5
*** Results: 0% dropped (30/30 received)
```



E-) Criando regras de MAC para diferentes hosts



F-) Testes de Ping h1 → h2, h1→ h6, h2→ h1 e h6 → h1