C115
Trabalho de Mininet
(Aprendizado)

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Criando a topologia

MAC padronizado| bandwidth = 35Mbps | controlador mininet

mininet@mininet-vm: ~

mininet@mininet-vm: ~ 149x39

```
➜ ~ ssh -Y mininet@192.168.56.101
mininet@192.168.56.101's password:
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 5.4.0-42-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

New release '22.04.3 LTS' available.
mininet@mininet-vm:~$ sudo -E mn --topo tree,depth=3,fanout=3 --mac --link tc,bw=35
*** Creating network
*** Adding controller
*** Adding hosts:
h1 h2 h3 h4 h5 h6 h7 h8 h9 h10 h11 h12 h13 h14 h15 h16 h17 h18 h19 h20 h21 h22 h23 h24 h25 h26 h27
*** Adding switches:
s1 s2 s3 s4 s5 s6 s7 s8 s9 s10 s11 s12 s13
*** Adding links:
(35.00Mbit) (35.00Mbit) (s1, s2) (35.00Mbit) (35.00Mbit) (s1, s6) (35.00Mbit) (35.00Mbit) (s1, s10) (35.00Mbit) (35.00Mbit) (s2, s3) (35.00Mbit) (35.
00Mbit) (s2, s4) (35.00Mbit) (35.00Mbit) (s2, s5) (35.00Mbit) (35.00Mbit) (s3, h1) (35.00Mbit) (35.00Mbit) (s3, h2) (35.00Mbit) (35.00Mbit) (s3, h3)
(35.00Mbit) (35.00Mbit) (s4, h4) (35.00Mbit) (35.00Mbit) (s4, h5) (35.00Mbit) (35.00Mbit) (s4, h6) (35.00Mbit) (35.00Mbit) (s5, h7) (35.00Mbit) (35.0
0Mbit) (s5, h8) (35.00Mbit) (35.00Mbit) (s5, h9) (35.00Mbit) (35.00Mbit) (s6, s7) (35.00Mbit) (35.00Mbit) (s6, s8) (35.00Mbit) (35.00Mbit) (s6, s9) (
35.00Mbit) (35.00Mbit) (s7, h10) (35.00Mbit) (35.00Mbit) (s7, h11) (35.00Mbit) (35.00Mbit) (s7, h12) (35.00Mbit) (35.00Mbit) (s8, h13) (35.00Mbit) (3
5.00Mbit) (s8, h14) (35.00Mbit) (35.00Mbit) (s8, h15) (35.00Mbit) (35.00Mbit) (s9, h16) (35.00Mbit) (35.00Mbit) (s9, h17) (35.00Mbit) (35.00Mbit) (s9
, h18) (35.00Mbit) (35.00Mbit) (s10, s11) (35.00Mbit) (35.00Mbit) (s10, s12) (35.00Mbit) (35.00Mbit) (s10, s13) (35.00Mbit) (35.00Mbit) (s11, h19) (3
5.00Mbit) (35.00Mbit) (s11, h20) (35.00Mbit) (35.00Mbit) (s11, h21) (35.00Mbit) (35.00Mbit) (s12, h22) (35.00Mbit) (35.00Mbit) (s12, h23) (35.00Mbit)
 (35.00Mbit) (s12, h24) (35.00Mbit) (35.00Mbit) (s13, h25) (35.00Mbit) (35.00Mbit) (s13, h26) (35.00Mbit) (35.00Mbit) (s13, h27)
*** Configuring hosts
h1 h2 h3 h4 h5 h6 h7 h8 h9 h10 h11 h12 h13 h14 h15 h16 h17 h18 h19 h20 h21 h22 h23 h24 h25 h26 h27
*** Starting controller
c0
*** Starting 13 switches
s1 s2 s3 s4 s5 s6 s7 s8 s9 s10 s11 s12 s13 ...(35.00Mbit) (35.00Mbit) (35.00Mbit) (35.00Mbit) (35.00Mbit) (35.00Mbit) (35.00Mbit) (35.00Mbit) (35.00M
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*** Starting CLI:
mininet> //
```
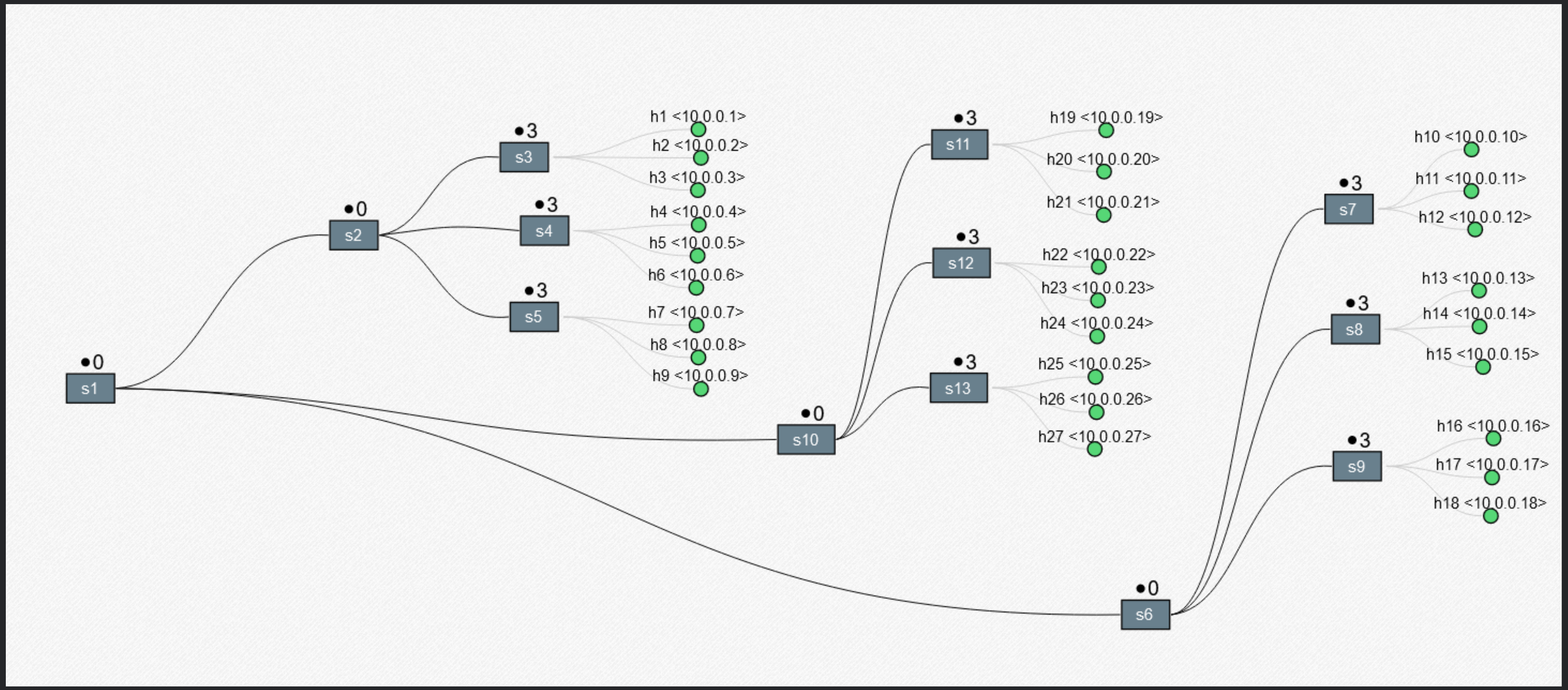
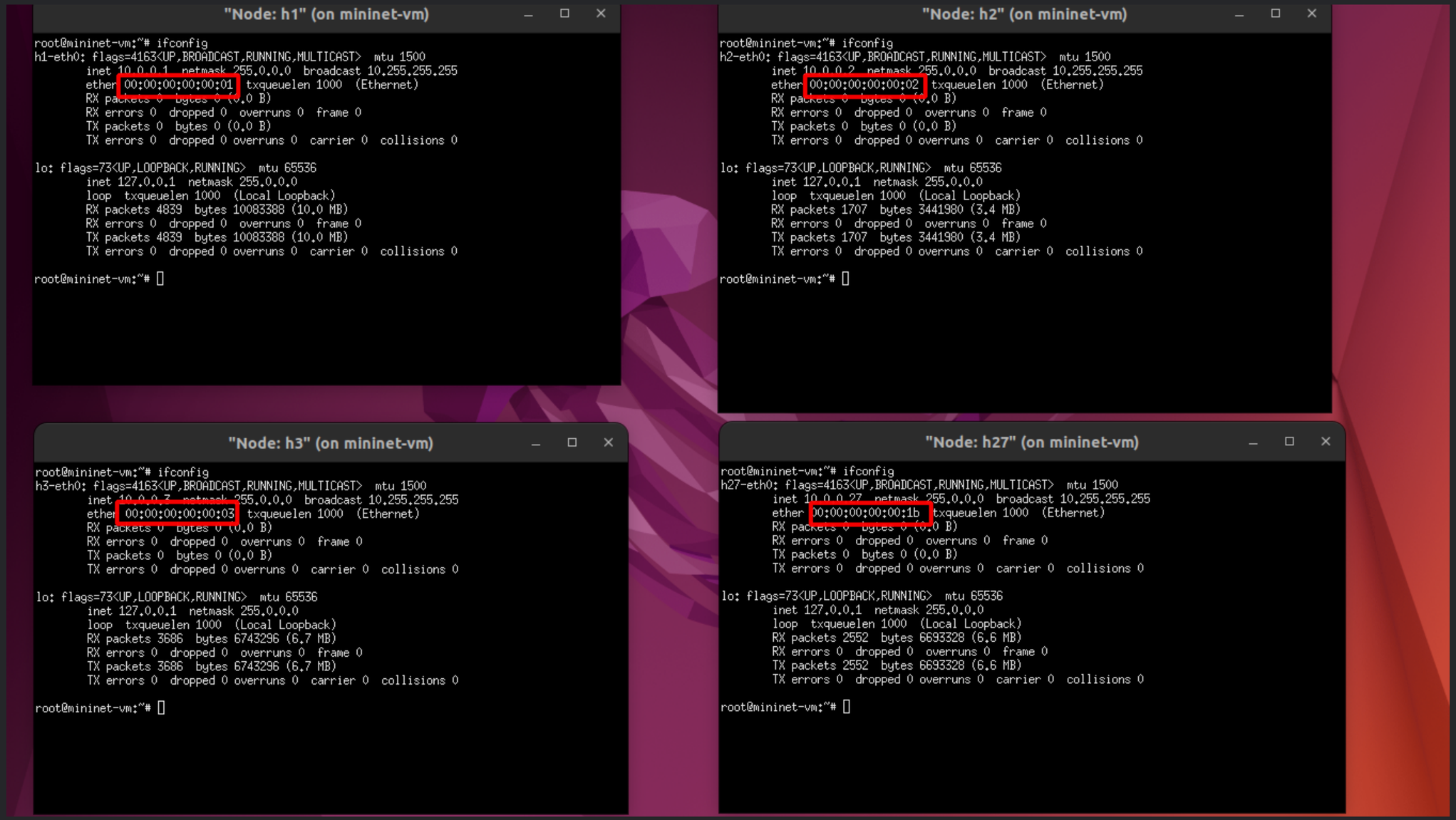



[Link: Mininet Topology Visualizer]

Endereços IP

```
mininet> dump
<Host h1: h1-eth0:10.0.0.1 pid=2736>
<Host h2: h2-eth0:10.0.0.2 pid=2738>
<Host h3: h3-eth0:10.0.0.3 pid=2740>
<Host h4: h4-eth0:10.0.0.4 pid=2742>
<Host h5: h5-eth0:10.0.0.5 pid=2744>
<Host h6: h6-eth0:10.0.0.6 pid=2746>
<Host h7: h7-eth0:10.0.0.7 pid=2748>
<Host h8: h8-eth0:10.0.0.8 pid=2750>
<Host h9: h9-eth0:10.0.0.9 pid=2752>
<Host h10: h10-eth0:10.0.0.10 pid=2754>
<Host h11: h11-eth0:10.0.0.11 pid=2756>
<Host h12: h12-eth0:10.0.0.12 pid=2758>
<Host h13: h13-eth0:10.0.0.13 pid=2760>
<Host h14: h14-eth0:10.0.0.14 pid=2762>
<Host h15: h15-eth0:10.0.0.15 pid=2764>
<Host h16: h16-eth0:10.0.0.16 pid=2766>
<Host h17: h17-eth0:10.0.0.17 pid=2768>
<Host h18: h18-eth0:10.0.0.18 pid=2770>
<Host h19: h19-eth0:10.0.0.19 pid=2772>
<Host h20: h20-eth0:10.0.0.20 pid=2774>
<Host h21: h21-eth0:10.0.0.21 pid=2776>
<Host h22: h22-eth0:10.0.0.22 pid=2778>
<Host h23: h23-eth0:10.0.0.23 pid=2780>
<Host h24: h24-eth0:10.0.0.24 pid=2782>
<Host h25: h25-eth0:10.0.0.25 pid=2784>
<Host h26: h26-eth0:10.0.0.26 pid=2786>
<Host h27: h27-eth0:10.0.0.27 pid=2788>
<OVSSwitch s1: lo:127.0.0.1,s1-eth1:None,s1-eth2:None,s1-eth3:None pid=2793>
<OVSSwitch s2: lo:127.0.0.1,s2-eth1:None,s2-eth2:None,s2-eth3:None,s2-eth4:None pid=2796>
<OVSSwitch s3: lo:127.0.0.1,s3-eth1:None,s3-eth2:None,s3-eth3:None,s3-eth4:None pid=2799>
<OVSSwitch s4: lo:127.0.0.1,s4-eth1:None,s4-eth2:None,s4-eth3:None,s4-eth4:None pid=2802>
<OVSSwitch s5: lo:127.0.0.1,s5-eth1:None,s5-eth2:None,s5-eth3:None,s5-eth4:None pid=2805>
<OVSSwitch s6: lo:127.0.0.1,s6-eth1:None,s6-eth2:None,s6-eth3:None,s6-eth4:None pid=2808>
<OVSSwitch s7: lo:127.0.0.1,s7-eth1:None,s7-eth2:None,s7-eth3:None,s7-eth4:None pid=2811>
<OVSSwitch s8: lo:127.0.0.1,s8-eth1:None,s8-eth2:None,s8-eth3:None,s8-eth4:None pid=2814>
<OVSSwitch s9: lo:127.0.0.1,s9-eth1:None,s9-eth2:None,s9-eth3:None,s9-eth4:None pid=2817>
<OVSSwitch s10: lo:127.0.0.1,s10-eth1:None,s10-eth2:None,s10-eth3:None,s10-eth4:None pid=2820>
<OVSSwitch s11: lo:127.0.0.1,s11-eth1:None,s11-eth2:None,s11-eth3:None,s11-eth4:None pid=2823>
<OVSSwitch s12: lo:127.0.0.1,s12-eth1:None,s12-eth2:None,s12-eth3:None,s12-eth4:None pid=2826>
<OVSSwitch s13: lo:127.0.0.1,s13-eth1:None,s13-eth2:None,s13-eth3:None,s13-eth4:None pid=2829>
<Controller c0: 127.0.0.1:6653 pid=2729>
mininet> /
```

Endereços MAC (hosts)



Endereços MAC (switch)

interfaces s1

```
s1-eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        ether 62:31:99:68:38:ad  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

s1-eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        ether fa:5a:15:40:7a:2e  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

s1-eth3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        ether 0a:32:f9:88:97:fa  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

interfaces s2

```
s2-eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        ether ae:12:29:17:b8:71  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

s2-eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        ether 5e:f2:0a:78:a3:4c  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

s2-eth3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        ether 32:78:13:76:87:cc  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

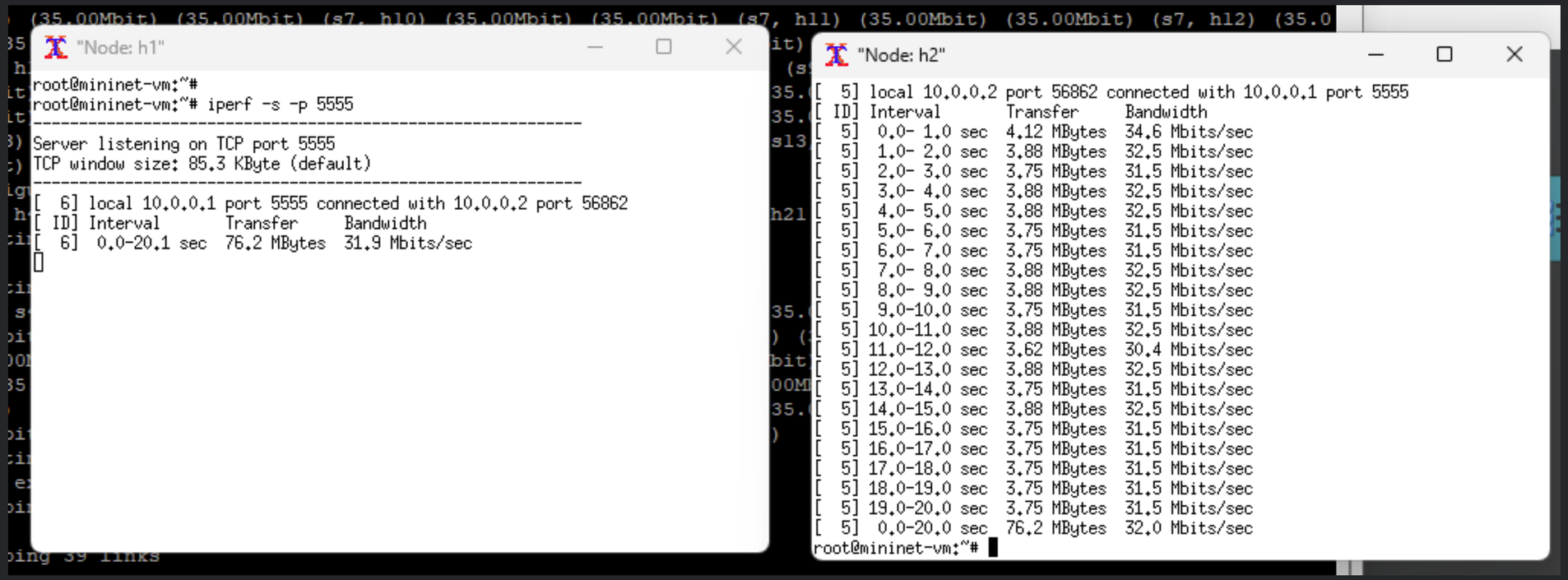
Pings

```
mininet> h1 ping h2
PING 10.0.0.2 (10.0.0.2) 56(84) bytes of data.
64 bytes from 10.0.0.2: icmp_seq=1 ttl=64 time=4.37 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.194 ms
64 bytes from 10.0.0.2: icmp_seq=3 ttl=64 time=0.047 ms
64 bytes from 10.0.0.2: icmp_seq=4 ttl=64 time=0.041 ms
64 bytes from 10.0.0.2: icmp_seq=5 ttl=64 time=0.046 ms
```

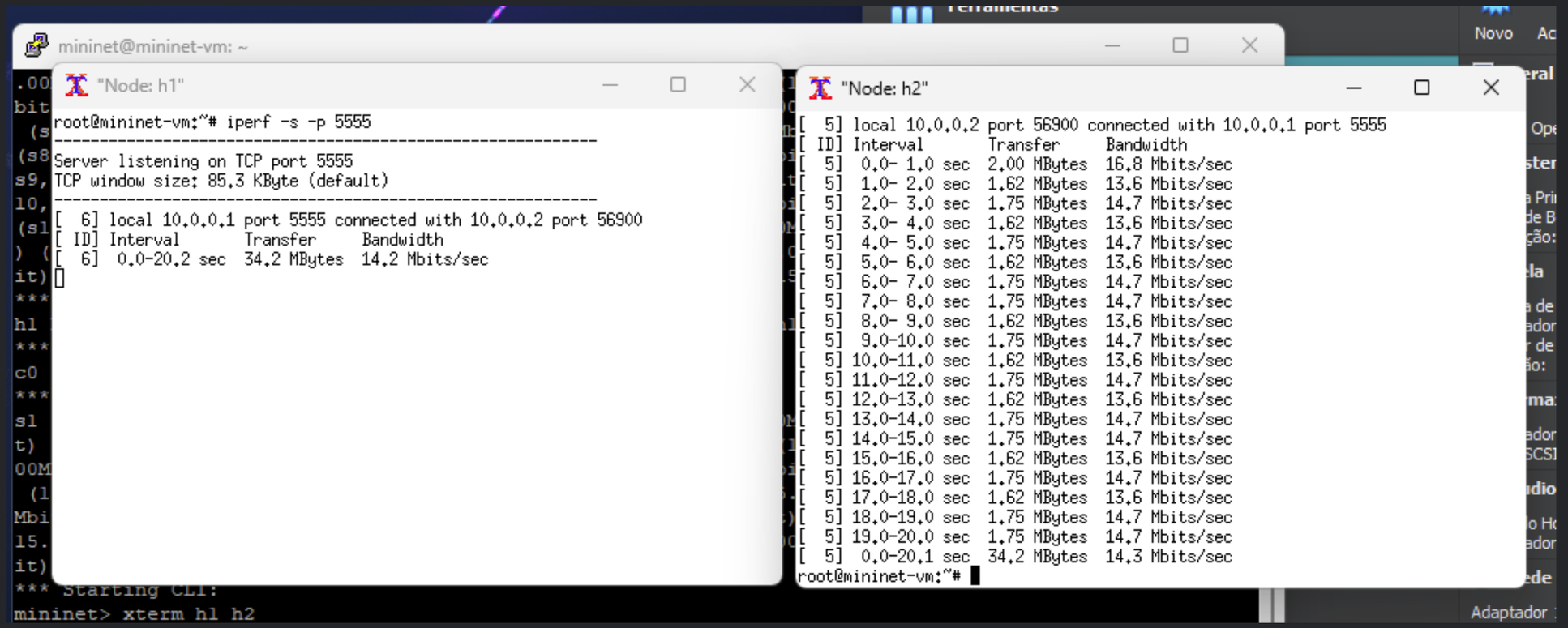
```
mininet> h1 ping h27
PING 10.0.0.27 (10.0.0.27) 56(84) bytes of data.
64 bytes from 10.0.0.27: icmp_seq=1 ttl=64 time=6.32 ms
64 bytes from 10.0.0.27: icmp_seq=2 ttl=64 time=0.390 ms
64 bytes from 10.0.0.27: icmp_seq=3 ttl=64 time=0.083 ms
64 bytes from 10.0.0.27: icmp_seq=4 ttl=64 time=0.123 ms
/
```

```
mininet> h3 ping h19
PING 10.0.0.19 (10.0.0.19) 56(84) bytes of data.
64 bytes from 10.0.0.19: icmp_seq=1 ttl=64 time=5.47 ms
64 bytes from 10.0.0.19: icmp_seq=2 ttl=64 time=0.427 ms
64 bytes from 10.0.0.19: icmp_seq=3 ttl=64 time=0.074 ms
64 bytes from 10.0.0.19: icmp_seq=4 ttl=64 time=0.106 ms
64 bytes from 10.0.0.19: icmp_seq=5 ttl=64 time=0.074 ms
```

Especificando que o host 1 na porta 5555 vai ser um servidor TCP e o host 2 um cliente e executando testes de iperf, considerando um relatório por segundo com teste de 20 segundos. Fazendo os testes para a largura de banda de 35 Mbps



Especificando que o host 1 na porta 5555 vai ser um servidor TCP e o host 2 um cliente e executando testes de iperf, considerando um relatório por segundo com teste de 20 segundos. Fazendo os testes para a larguras de banda de 15 Mbps.



Obrigado!