Universidad Nacional del Comahue
Facultad de Informática
2025

Lab VLAN

Redes II, TUASySL

1.

```
pc1:~# ping -c 3 pc2
PING pc2 (192.168.0.2) 56(84) bytes of data.
64 bytes from pc2 (192.168.0.2): icmp_seq=1 ttl=63 time=14.3 ms
64 bytes from pc2 (192.168.0.2): icmp_seq=2 ttl=63 time=2.38 ms
64 bytes from pc2 (192.168.0.2): icmp_seq=3 ttl=63 time=1.65 ms

--- pc2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2006ms
rtt min/avg/max/mdev = 1.652/6.127/14.344/5.818 ms
pc1:~#

pc1:~# ping -c 3 pc3
PING pc3 (192.168.0.3) 56(84) bytes of data.
64 bytes from pc3 (192.168.0.3): icmp_seq=1 ttl=63 time=8.09 ms
64 bytes from pc3 (192.168.0.3): icmp_seq=2 ttl=63 time=0.345 ms
64 bytes from pc3 (192.168.0.3): icmp_seq=3 ttl=63 time=1.75 ms

--- pc3 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2007ms
rtt min/avg/max/mdev = 0.345/3.399/8.093/3.368 ms
pc1:~#

pc1:~# ping -c 3 pc4
PING pc4 (10.0.0.3) 56(84) bytes of data.
64 bytes from pc4 (10.0.0.3): icmp_seq=1 ttl=64 time=10.8 ms
64 bytes from pc4 (10.0.0.3): icmp_seq=2 ttl=64 time=1.91 ms
64 bytes from pc4 (10.0.0.3): icmp_seq=3 ttl=64 time=1.03 ms

--- pc4 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2005ms
rtt min/avg/max/mdev = 1.038/4.586/10.806/4.413 ms
pc1:~#

pc1:~# ping -c 3 r1
PING r1 (10.0.0.1) 56(84) bytes of data.
64 bytes from r1 (10.0.0.1): icmp_seq=1 ttl=64 time=0.242 ms
64 bytes from r1 (10.0.0.1): icmp_seq=2 ttl=64 time=1.10 ms
64 bytes from r1 (10.0.0.1): icmp_seq=3 ttl=64 time=0.656 ms

--- r1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2007ms
rtt min/avg/max/mdev = 0.242/0.668/1.107/0.353 ms
pc1:~#
```

```
pc2:~# ping -c 3 pc1
PING pc1 (10.0.0.2) 56(84) bytes of data.
64 bytes from pc1 (10.0.0.2): icmp_seq=1 ttl=63 time=16.9 ms
64 bytes from pc1 (10.0.0.2): icmp_seq=2 ttl=63 time=2.09 ms
64 bytes from pc1 (10.0.0.2): icmp_seq=3 ttl=63 time=0.373 ms

--- pc1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 0.373/6.462/16.916/7.425 ms
pc2:~#

pc2:~# ping -c 3 pc3
PING pc3 (192.168.0.3) 56(84) bytes of data.
64 bytes from pc3 (192.168.0.3): icmp_seq=1 ttl=64 time=10.6 ms
64 bytes from pc3 (192.168.0.3): icmp_seq=2 ttl=64 time=1.09 ms
64 bytes from pc3 (192.168.0.3): icmp_seq=3 ttl=64 time=0.505 ms

--- pc3 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1998ms
rtt min/avg/max/mdev = 0.505/4.072/10.614/4.632 ms
pc2:~#

pc2:~# ping -c 3 pc4
PING pc4 (10.0.0.3) 56(84) bytes of data.
64 bytes from pc4 (10.0.0.3): icmp_seq=1 ttl=63 time=7.50 ms
64 bytes from pc4 (10.0.0.3): icmp_seq=2 ttl=63 time=2.04 ms
64 bytes from pc4 (10.0.0.3): icmp_seq=3 ttl=63 time=1.93 ms

--- pc4 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2009ms
rtt min/avg/max/mdev = 1.937/3.828/7.503/2.599 ms
pc2:~#
pc2:~# ping -c 3 r1
PING r1 (192.168.0.1) 56(84) bytes of data.
64 bytes from r1 (192.168.0.1): icmp_seq=1 ttl=64 time=0.191 ms
64 bytes from r1 (192.168.0.1): icmp_seq=2 ttl=64 time=0.225 ms
64 bytes from r1 (192.168.0.1): icmp_seq=3 ttl=64 time=0.299 ms

--- r1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1998ms
rtt min/avg/max/mdev = 0.191/0.238/0.299/0.046 ms
pc2:~#
```

```
pc3:~# ping -c 3 pc1
PING pc1 (10.0.0.2) 56(84) bytes of data.
64 bytes from pc1 (10.0.0.2): icmp_seq=1 ttl=63 time=10.5 ms
64 bytes from pc1 (10.0.0.2): icmp_seq=2 ttl=63 time=0.871 ms
64 bytes from pc1 (10.0.0.2): icmp_seq=3 ttl=63 time=1.74 ms

--- pc1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1999ms
```

```
rtt min/avg/max/mdev = 0.871/4.399/10.581/4.386 ms
pc3:~#

pc3:~# ping -c 3 pc2
PING pc2 (192.168.0.2) 56(84) bytes of data.
64 bytes from pc2 (192.168.0.2): icmp_seq=1 ttl=64 time=10.5 ms
64 bytes from pc2 (192.168.0.2): icmp_seq=2 ttl=64 time=1.08 ms
64 bytes from pc2 (192.168.0.2): icmp_seq=3 ttl=64 time=1.14 ms

--- pc2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1998ms
rtt min/avg/max/mdev = 1.088/4.269/10.579/4.461 ms
pc3:~#

pc3:~# ping -c 3 pc4
PING pc4 (10.0.0.3) 56(84) bytes of data.
64 bytes from pc4 (10.0.0.3): icmp_seq=1 ttl=63 time=0.534 ms
64 bytes from pc4 (10.0.0.3): icmp_seq=2 ttl=63 time=2.00 ms
64 bytes from pc4 (10.0.0.3): icmp_seq=3 ttl=63 time=2.41 ms

--- pc4 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2011ms
rtt min/avg/max/mdev = 0.534/1.651/2.416/0.807 ms
pc3:~#

pc3:~# ping -c 3 r1
PING r1 (192.168.0.1) 56(84) bytes of data.
64 bytes from r1 (192.168.0.1): icmp_seq=1 ttl=64 time=0.314 ms
64 bytes from r1 (192.168.0.1): icmp_seq=2 ttl=64 time=1.37 ms
64 bytes from r1 (192.168.0.1): icmp_seq=3 ttl=64 time=0.845 ms

--- r1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2007ms
rtt min/avg/max/mdev = 0.314/0.844/1.374/0.433 ms
pc3:~#
```

```
pc4:~# ping -c 3 pc1
PING pc1 (10.0.0.2) 56(84) bytes of data.
64 bytes from pc1 (10.0.0.2): icmp_seq=1 ttl=64 time=5.28 ms
64 bytes from pc1 (10.0.0.2): icmp_seq=2 ttl=64 time=1.43 ms
64 bytes from pc1 (10.0.0.2): icmp_seq=3 ttl=64 time=1.00 ms

--- pc1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2005ms
rtt min/avg/max/mdev = 1.005/2.574/5.285/1.925 ms
pc4:~#

pc4:~# ping -c 3 pc2
PING pc2 (192.168.0.2) 56(84) bytes of data.
64 bytes from pc2 (192.168.0.2): icmp_seq=1 ttl=63 time=8.16 ms
64 bytes from pc2 (192.168.0.2): icmp_seq=2 ttl=63 time=0.741 ms
```

```
64 bytes from pc2 (192.168.0.2): icmp_seq=3 ttl=63 time=0.834 ms

--- pc2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1998ms
rtt min/avg/max/mdev = 0.741/3.247/8.166/3.478 ms
pc4:~#

pc4:~# ping -c 3 pc3
PING pc3 (192.168.0.3) 56(84) bytes of data.
64 bytes from pc3 (192.168.0.3): icmp_seq=1 ttl=63 time=0.496 ms
64 bytes from pc3 (192.168.0.3): icmp_seq=2 ttl=63 time=0.537 ms
64 bytes from pc3 (192.168.0.3): icmp_seq=3 ttl=63 time=0.665 ms

--- pc3 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1998ms
rtt min/avg/max/mdev = 0.496/0.566/0.665/0.071 ms
pc4:~#

pc4:~# ping -c 3 r1
PING r1 (10.0.0.1) 56(84) bytes of data.
64 bytes from r1 (10.0.0.1): icmp_seq=1 ttl=64 time=0.316 ms
64 bytes from r1 (10.0.0.1): icmp_seq=2 ttl=64 time=1.08 ms
64 bytes from r1 (10.0.0.1): icmp_seq=3 ttl=64 time=0.489 ms

--- r1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2007ms
rtt min/avg/max/mdev = 0.316/0.629/1.083/0.329 ms
pc4:~#
```

```
r1:~# ping -c 3 pc1
PING pc1 (10.0.0.2) 56(84) bytes of data.
64 bytes from pc1 (10.0.0.2): icmp_seq=1 ttl=64 time=0.207 ms
64 bytes from pc1 (10.0.0.2): icmp_seq=2 ttl=64 time=1.04 ms
64 bytes from pc1 (10.0.0.2): icmp_seq=3 ttl=64 time=0.918 ms

--- pc1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2011ms
rtt min/avg/max/mdev = 0.207/0.723/1.046/0.370 ms
r1:~#

r1:~# ping -c 3 pc2
PING pc2 (192.168.0.2) 56(84) bytes of data.
64 bytes from pc2 (192.168.0.2): icmp_seq=1 ttl=64 time=0.218 ms
64 bytes from pc2 (192.168.0.2): icmp_seq=2 ttl=64 time=0.675 ms
64 bytes from pc2 (192.168.0.2): icmp_seq=3 ttl=64 time=1.03 ms

--- pc2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2007ms
rtt min/avg/max/mdev = 0.218/0.641/1.031/0.333 ms
r1:~#
```

```
r1:~# ping -c 3 pc3
PING pc3 (192.168.0.3) 56(84) bytes of data.
64 bytes from pc3 (192.168.0.3): icmp_seq=1 ttl=64 time=0.306 ms
64 bytes from pc3 (192.168.0.3): icmp_seq=2 ttl=64 time=1.46 ms
64 bytes from pc3 (192.168.0.3): icmp_seq=3 ttl=64 time=1.21 ms

--- pc3 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2006ms
rtt min/avg/max/mdev = 0.306/0.994/1.465/0.497 ms
r1:~#

r1:~# ping -c 3 pc4
PING pc4 (10.0.0.3) 56(84) bytes of data.
64 bytes from pc4 (10.0.0.3): icmp_seq=1 ttl=64 time=0.283 ms
64 bytes from pc4 (10.0.0.3): icmp_seq=2 ttl=64 time=1.38 ms
64 bytes from pc4 (10.0.0.3): icmp_seq=3 ttl=64 time=0.847 ms

--- pc4 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2006ms
rtt min/avg/max/mdev = 0.283/0.838/1.385/0.450 ms
r1:~#
```

2. variamos las cache arp

```
r1:~# ip -s -s neigh flush all
192.168.0.3 dev eth0.20 lladdr 00:00:00:00:00:03 ref 4 used 111/111/82 STALE
192.168.0.2 dev eth0.20 lladdr 00:00:00:00:00:02 ref 4 used 135/135/107 STALE
10.0.0.3 dev eth0.10 lladdr 00:00:00:00:00:04 ref 4 used 90/90/70 STALE
10.0.0.2 dev eth0.10 lladdr 00:00:00:00:00:01 ref 4 used 145/145/125 STALE

*** Round 1, deleting 4 entries ***
*** Flush is complete after 1 round ***
r1:~#

pc1:~# ip -s -s neigh flush all
10.0.0.3 dev eth0 lladdr 00:00:00:00:00:04 ref 1 used 236/236/197 STALE
10.0.0.1 dev eth0 lladdr 00:00:00:00:00:0a ref 2 used 153/153/114 STALE

*** Round 1, deleting 2 entries ***
*** Flush is complete after 1 round ***
pc1:~#

pc4:~# ip -s -s neigh flush all
10.0.0.2 dev eth0 lladdr 00:00:00:00:00:01 ref 2 used 240/240/223 STALE
10.0.0.1 dev eth0 lladdr 00:00:00:00:00:0a ref 6 used 104/104/73 STALE

*** Round 1, deleting 2 entries ***
*** Flush is complete after 1 round ***
pc4:~#
```

iniciamos los monitores en segundo plano

```
r1:~# tcpdump -s 0 -w /hostlab/r1.cap &
[1] 814
r1:~# tcpdump: WARNING: eth0: no IPv4 address assigned
tcpdump: listening on eth0, link-type EN10MB (Ethernet), capture size 65535 bytes
job
-bash: job: command not found
r1:~# jobs
[1]+  Running                 tcpdump -s 0 -w /hostlab/r1.cap &
r1:~#
```

```
pc2:~# tcpdump -s 0 -w /hostlab/pc2.cap &
[1] 1649
pc2:~# tcpdump: listening on eth0, link-type EN10MB (Ethernet), capture size 65535 bytes
jobs
[1]+  Running                 tcpdump -s 0 -w /hostlab/pc2.cap &
pc2:~#
```

```
pc4:~# tcpdump -s 0 -w /hostlab/pc4.cap &
[1] 815
pc4:~# tcpdump: listening on eth0, link-type EN10MB (Ethernet), capture size 65535 bytes
jobs
[1]+  Running                 tcpdump -s 0 -w /hostlab/pc4.cap &
pc4:~#
```

hacemos ping de pc1 a pc4

```
pc1:~# ping -c 3 pc4
PING pc4 (10.0.0.3) 56(84) bytes of data.
64 bytes from pc4 (10.0.0.3): icmp_seq=1 ttl=64 time=10.6 ms
64 bytes from pc4 (10.0.0.3): icmp_seq=2 ttl=64 time=0.494 ms
64 bytes from pc4 (10.0.0.3): icmp_seq=3 ttl=64 time=0.365 ms

--- pc4 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 0.365/3.850/10.693/4.839 ms
pc1:~#
```

detenemos la captura

```
r1:~# fg 1
tcpdump -s 0 -w /hostlab/r1.cap
1 packets captured
1 packets received by filter
0 packets dropped by kernel
r1:~#
```

```
pc1:~# fg 1
tcpdump -s 0 -w /hostlab/pc1.cap
10 packets captured
10 packets received by filter
0 packets dropped by kernel
pc1:~#
```

```
pc4:~# fg 1
tcpdump -s 0 -w /hostlab/pc4.cap
10 packets captured
10 packets received by filter
0 packets dropped by kernel
pc4:~#
```

wireshark r1

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	00:00:00_00:00:01	Broadcast	ARP	46	Who has 10.0.0.3? Tell 10.0.0.2

wireshark pc2

Aplique un filtro de visualización ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info

wireshark pc4

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	00:00:00_00:00:01	Broadcast	ARP	42	Who has 10.0.0.3? Tell 10.0.0.2
2	0.000024	00:00:00_00:00:04	00:00:00_00:00:01	ARP	42	10.0.0.3 is at 00:00:00:00:00:04
3	0.000143	10.0.0.2	10.0.0.3	ICMP	98	Echo (ping) request id=0x3303, seq=1/256, ttl=64 (reply in 4)
4	0.000161	10.0.0.3	10.0.0.2	ICMP	98	Echo (ping) reply id=0x3303, seq=1/256, ttl=64 (request in 3)
5	0.994323	10.0.0.2	10.0.0.3	ICMP	98	Echo (ping) request id=0x3303, seq=2/512, ttl=64 (reply in 6)
6	0.994336	10.0.0.3	10.0.0.2	ICMP	98	Echo (ping) reply id=0x3303, seq=2/512, ttl=64 (request in 5)
7	1.993294	10.0.0.2	10.0.0.3	ICMP	98	Echo (ping) request id=0x3303, seq=3/768, ttl=64 (reply in 8)
8	1.993310	10.0.0.3	10.0.0.2	ICMP	98	Echo (ping) reply id=0x3303, seq=3/768, ttl=64 (request in 7)
9	4.990452	00:00:00_00:00:04	00:00:00_00:00:01	ARP	42	Who has 10.0.0.2? Tell 10.0.0.3
10	4.991815	00:00:00_00:00:01	00:00:00_00:00:04	ARP	42	10.0.0.2 is at 00:00:00:00:00:01

Como los switches tienen configuradas las redes virtuales y mediante el protocolo de trunking envian los paquetes de las diferentes redes entres switches. pc1 y pc4 están en la misma red, r1 solo recibe el mensaje de broadcast (arp request por broadcast) de pc1 cuando hace ping a pc4, y luego pc1 y pc4 reciben los mensajes de arp request, replay y los icmp de ping. pc2 no recibe nada por que las vlans crean segmentos de broadcast separados para cada red aunque las computadoras están conectadas al mismo switch.

3. limpiamos las caches

```
pc2:~# ip -s -s neigh flush all
Nothing to flush.
pc2:~#
```

```
pc3:~# ip -s -s neigh flush all
Nothing to flush.
pc3:~#
```

```
r1:~# ip -s -s neigh flush all
Nothing to flush.
r1:~#
```

luego comenzamos el monitores en segundo plano

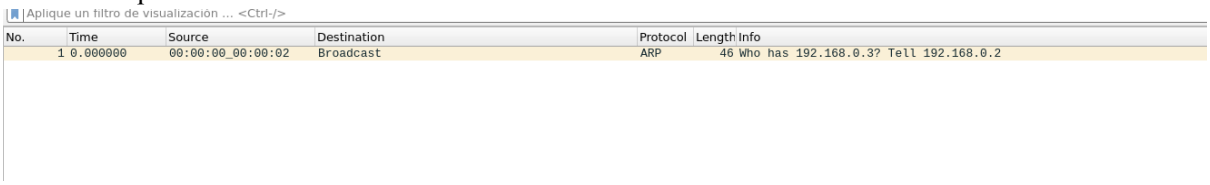
```
r1:~# tcpdump -s 0 -w /hostlab/r1.cap
tcpdump: WARNING: eth0: no IPv4 address assigned
tcpdump: listening on eth0, link-type EN10MB (Ethernet), capture size 65535 bytes
```

hacemos los ping de pc2 a pc3

```
pc2:~# ping -c 3 pc3
PING pc3 (192.168.0.3) 56(84) bytes of data.
64 bytes from pc3 (192.168.0.3): icmp_seq=1 ttl=64 time=10.5 ms
64 bytes from pc3 (192.168.0.3): icmp_seq=2 ttl=64 time=1.49 ms
64 bytes from pc3 (192.168.0.3): icmp_seq=3 ttl=64 time=1.00 ms

--- pc3 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1998ms
rtt min/avg/max/mdev = 1.007/4.333/10.504/4.368 ms
pc2:~#
```

lo que observamos en r1 es



pasa algo similar al punto anterior, y el r1 solo recibe el mensaje broadcast inicial cuando se quiere conocer la mac de pc3.

4.

```
pc1:~# traceroute pc4
traceroute to pc4 (10.0.0.3), 64 hops max, 40 byte packets
 1  pc4 (10.0.0.3)  11 ms  0 ms  0 ms
pc1:~#
```

Como pc1 y pc4 están en la misma vlan pueden comunicarse entre si, si bien están en diferentes switches estos usan el protocolo de trunking para poder enviar los paquetes entre computadoras de una misma red en otros switches. Para las computadoras están en la misma red fisica.

```
pc1:~# traceroute pc3
traceroute to pc3 (192.168.0.3), 64 hops max, 40 byte packets
 1  r1 (10.0.0.1)  11 ms  0 ms  0 ms
 2  pc3 (192.168.0.3)  4 ms  0 ms  0 ms
pc1:~#
```

En esta caso siempre es necesario un router para conectar dos vlans (un que esten en el mismo switch). Por lo que el router va a redirigir los mensajes entre computadoras de diferentes redes.

5.

```
s1:~# brctl show
bridge name     bridge id           STP enabled     interfaces
vlan10          8000.000000000100       no          eth0.10
                                                    eth1
                                                    eth3.10
vlan20          8000.000000000100       no          eth0.20
                                                    eth2
                                                    eth3.20
s1:~#
```

```
s2:~# brctl show
bridge name     bridge id               STP enabled     interfaces
vlan10          8000.000000000200       no              eth0.10
                                                        eth1
vlan20          8000.000000000200       no              eth0.20
                                                        eth2
s2:~#
```

Tienen el nombre de vlan10 y vlan20. Esta configuración se replica en los dos switches ademas de la configuración para poder hacer trunking entre los dos.

6.

```
pc1:~# ping -c 3 pc2
PING pc2 (192.168.0.2) 56(84) bytes of data.
64 bytes from pc2 (192.168.0.2): icmp_seq=1 ttl=63 time=14.1 ms
64 bytes from pc2 (192.168.0.2): icmp_seq=2 ttl=63 time=2.04 ms
64 bytes from pc2 (192.168.0.2): icmp_seq=3 ttl=63 time=1.53 ms

--- pc2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 1.534/5.912/14.162/5.837 ms
pc1:~# ping -c 3 pc3
PING pc3 (192.168.0.3) 56(84) bytes of data.
64 bytes from pc3 (192.168.0.3): icmp_seq=1 ttl=63 time=2.76 ms
64 bytes from pc3 (192.168.0.3): icmp_seq=2 ttl=63 time=2.46 ms
64 bytes from pc3 (192.168.0.3): icmp_seq=3 ttl=63 time=1.81 ms

--- pc3 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2010ms
rtt min/avg/max/mdev = 1.814/2.348/2.764/0.400 ms
pc1:~# ping -c 3 pc4
PING pc4 (10.0.0.3) 56(84) bytes of data.
64 bytes from pc4 (10.0.0.3): icmp_seq=1 ttl=64 time=10.6 ms
64 bytes from pc4 (10.0.0.3): icmp_seq=2 ttl=64 time=0.596 ms
64 bytes from pc4 (10.0.0.3): icmp_seq=3 ttl=64 time=0.718 ms

--- pc4 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1998ms
rtt min/avg/max/mdev = 0.596/3.984/10.640/4.706 ms
pc1:~#
```

* en este punto no entiendo que cambiaría cuando se hacen los ping.

```
s1:~# brctl showstp vlan10
vlan10
 bridge id              8000.000000000100
 designated root        8000.000000000100
 root port              0               path cost               0
 max age                20.00           bridge max age          20.00
 hello time             2.00            bridge hello time       2.00
 forward delay          15.00           bridge forward delay    15.00
```

```
 ageing time            300.00
 hello timer            1.03            tcn timer              0.00
 topology change timer  0.00            gc timer               12.03
 flags


eth0.10 (1)
 port id              8001              state              forwarding
 designated root      8000.000000000100 path cost          100
 designated bridge    8000.000000000100 message age timer  0.00
 designated port      8001              forward delay timer  0.00
 designated cost      0                 hold timer         0.03
 flags

eth1 (2)
 port id              8002              state              forwarding
 designated root      8000.000000000100 path cost          100
 designated bridge    8000.000000000100 message age timer  0.00
 designated port      8002              forward delay timer  0.00
 designated cost      0                 hold timer         0.03
 flags

eth3.10 (3)
 port id              8003              state              forwarding
 designated root      8000.000000000100 path cost          100
 designated bridge    8000.000000000100 message age timer  0.00
 designated port      8003              forward delay timer  0.00
 designated cost      0                 hold timer         0.03
 flags
s1:~# brctl showstp vlan20
vlan20
 bridge id            8000.000000000100
 designated root      8000.000000000100
 root port            0                 path cost          0
 max age              20.00             bridge max age     20.00
 hello time           2.00              bridge hello time  2.00
 forward delay        15.00             bridge forward delay  15.00
 ageing time          300.00
 hello timer          1.90              tcn timer          0.00
 topology change timer  0.00            gc timer           3.90
 flags


eth0.20 (1)
 port id              8001              state              forwarding
 designated root      8000.000000000100 path cost          100
 designated bridge    8000.000000000100 message age timer  0.00
 designated port      8001              forward delay timer  0.00
 designated cost      0                 hold timer         0.90
 flags
```

```
eth2 (2)
 port id              8002              state              forwarding
 designated root      8000.000000000100      path cost          100
 designated bridge    8000.000000000100      message age timer      0.00
 designated port      8002              forward delay timer    0.00
 designated cost      0                 hold timer             0.90
 flags

eth3.20 (3)
 port id              8003              state              forwarding
 designated root      8000.000000000100      path cost          100
 designated bridge    8000.000000000100      message age timer      0.00
 designated port      8003              forward delay timer    0.00
 designated cost      0                 hold timer             0.90
 flags

s1:~# brctl showmacs vlan10
port no mac addr            is local?       ageing timer
  1     00:00:00:00:01:00     yes             0.00
  2     00:00:00:00:01:01     yes             0.00
  3     00:00:00:00:01:03     yes             0.00
s1:~# brctl showmacs vlan20
port no mac addr            is local?       ageing timer
  1     00:00:00:00:01:00     yes             0.00
  2     00:00:00:00:01:02     yes             0.00
  3     00:00:00:00:01:03     yes             0.00
s1:~#
```

```
s2:~# brctl showstp vlan10
vlan10
 bridge id            8000.000000000200
 designated root      8000.000000000200
 root port            0                 path cost          0
 max age              20.00             bridge max age         20.00
 hello time           2.00              bridge hello time      2.00
 forward delay        15.00             bridge forward delay   15.00
 ageing time          300.00
 hello timer          1.47              tcn timer              0.00
 topology change timer  0.00            gc timer               15.47
 flags


eth0.10 (1)
 port id              8001              state              forwarding
 designated root      8000.000000000200      path cost          100
 designated bridge    8000.000000000200      message age timer      0.00
 designated port      8001              forward delay timer    0.00
 designated cost      0                 hold timer             0.47
 flags
```

```
eth1 (2)
 port id              8002              state              forwarding
 designated root      8000.000000000200      path cost          100
 designated bridge    8000.000000000200      message age timer      0.00
 designated port      8002              forward delay timer    0.00
 designated cost      0                 hold timer             0.47
 flags

s2:~# brctl showstp vlan20
vlan20
 bridge id            8000.000000000200
 designated root      8000.000000000200
 root port            0                 path cost          0
 max age              20.00             bridge max age     20.00
 hello time           2.00              bridge hello time  2.00
 forward delay        15.00             bridge forward delay   15.00
 ageing time          300.00
 hello timer          0.57              tcn timer          0.00
 topology change timer  0.00            gc timer           9.57
 flags


eth0.20 (1)
 port id              8001              state              forwarding
 designated root      8000.000000000200      path cost          100
 designated bridge    8000.000000000200      message age timer      0.00
 designated port      8001              forward delay timer    0.00
 designated cost      0                 hold timer             0.00
 flags

eth2 (2)
 port id              8002              state              forwarding
 designated root      8000.000000000200      path cost          100
 designated bridge    8000.000000000200      message age timer      0.00
 designated port      8002              forward delay timer    0.00
 designated cost      0                 hold timer             0.00
 flags

s2:~# brctl showmacs vlan10
port no mac addr            is local?       ageing timer
  1     00:00:00:00:02:00     yes             0.00
  2     00:00:00:00:02:01     yes             0.00
s2:~# brctl showmacs vlan20
port no mac addr            is local?       ageing timer
  1     00:00:00:00:02:00     yes             0.00
  2     00:00:00:00:02:02     yes             0.00
s2:~#
```

7. las pc tienen la configuración típica de IP-MAC , los switches y el router tienen la configuración para las vlans. Cada switch tiene la configuración de las vlans y que interfaces

van a reenviar el trafico hacia el otro switch (trunk), el router define su dirección mac, y se crean las interfaces lógicas vlan sobre eth0.

8. La separación es meramente lógica, ya que tenemos computadoras de ambas redes distribuidas en diferentes switches, pero estos segmentan los broadcast y conmutan lo mensajes entre host (ya que aprenden las mac), Existe una separación logica entre las redes, pero se propagan por los diferentes switches (trunking).