Project 4

Simple Router (layer 3)

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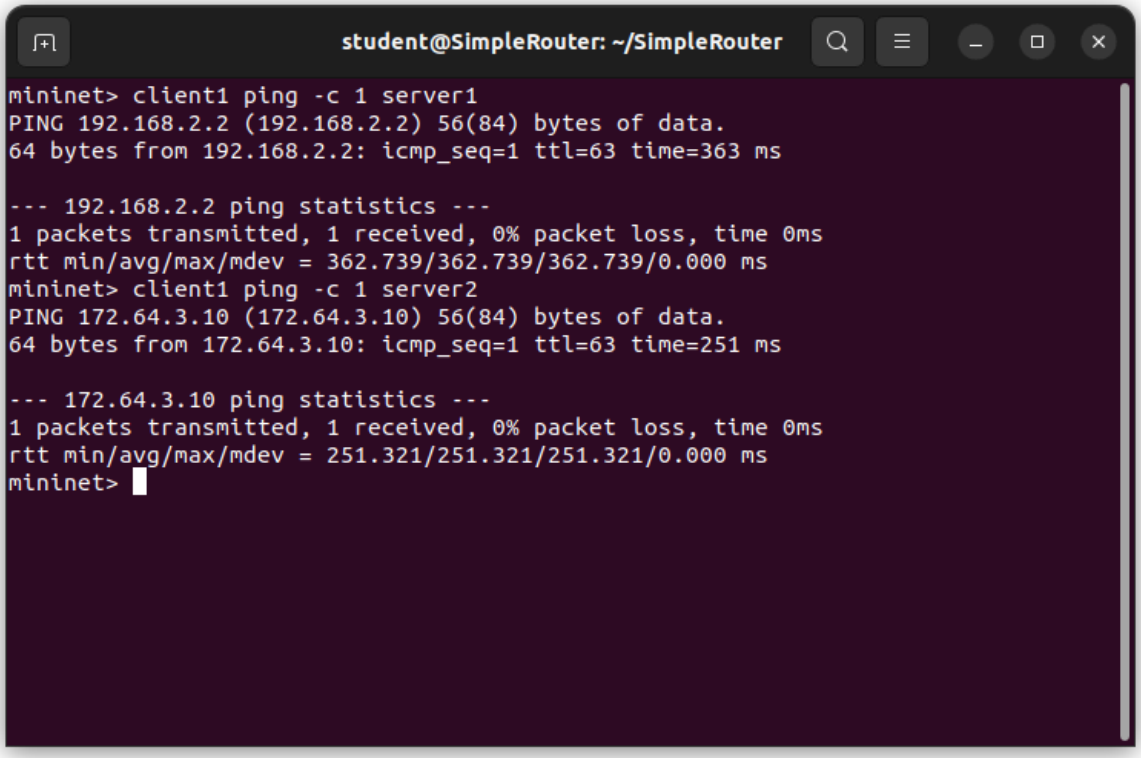
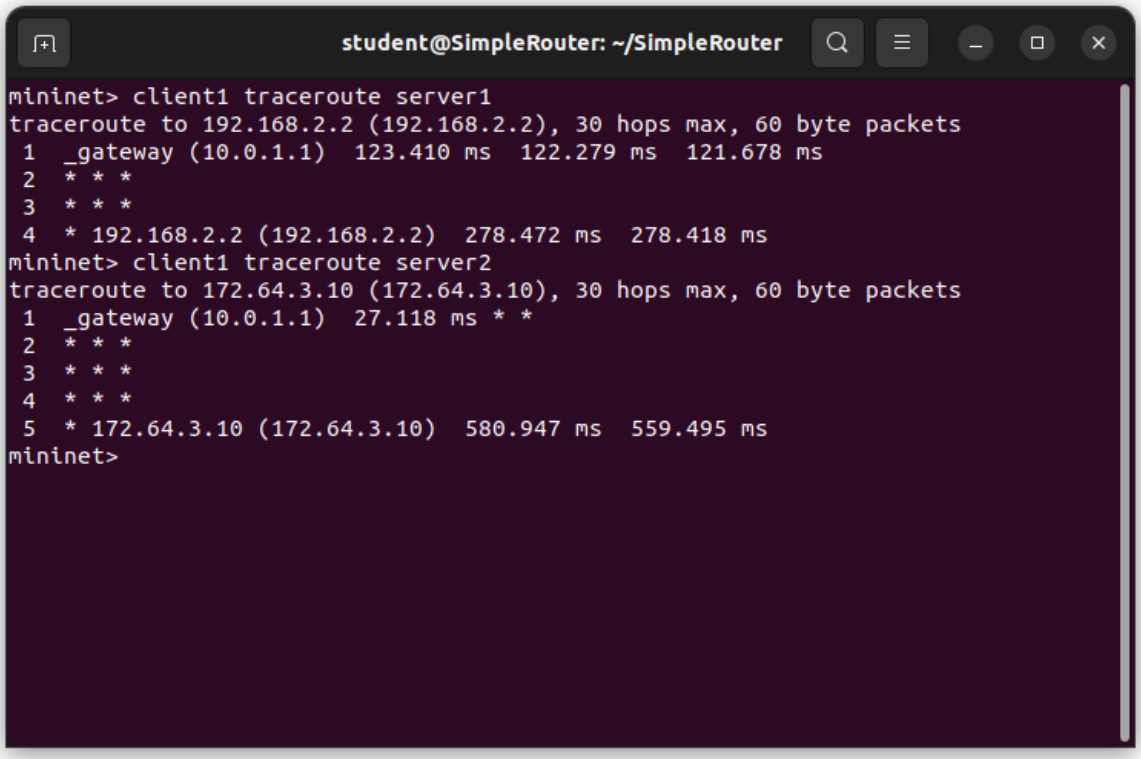
Commands

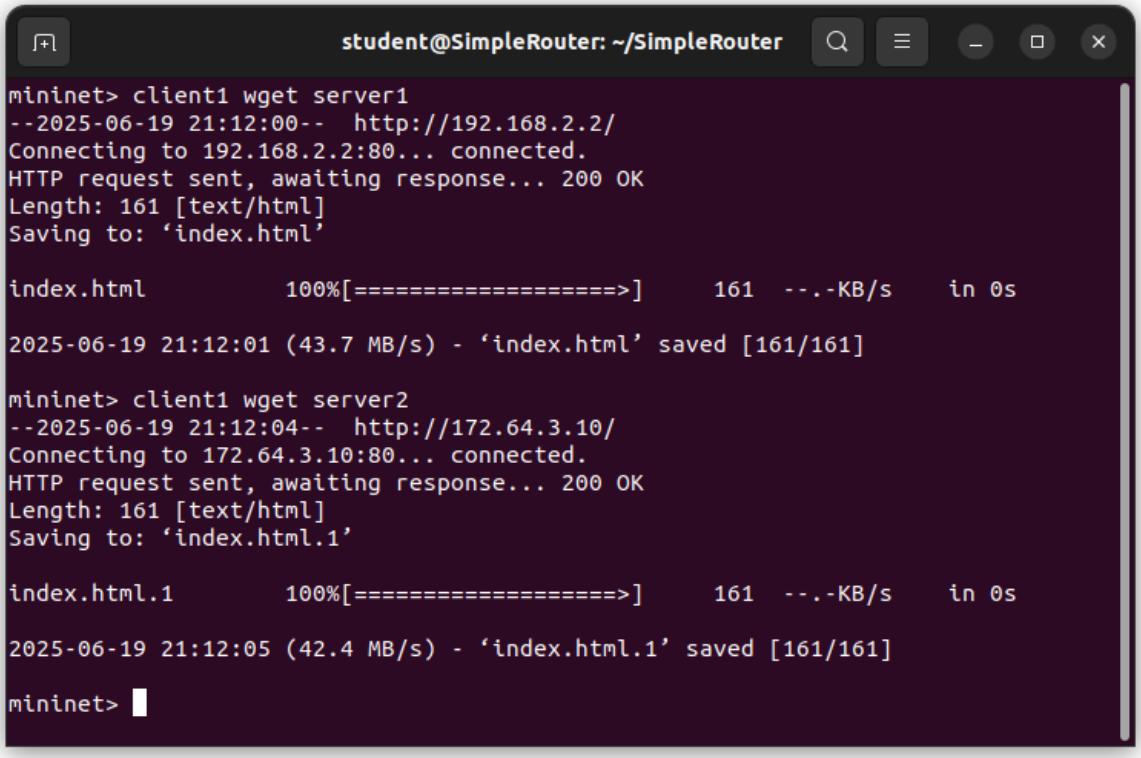
- ping



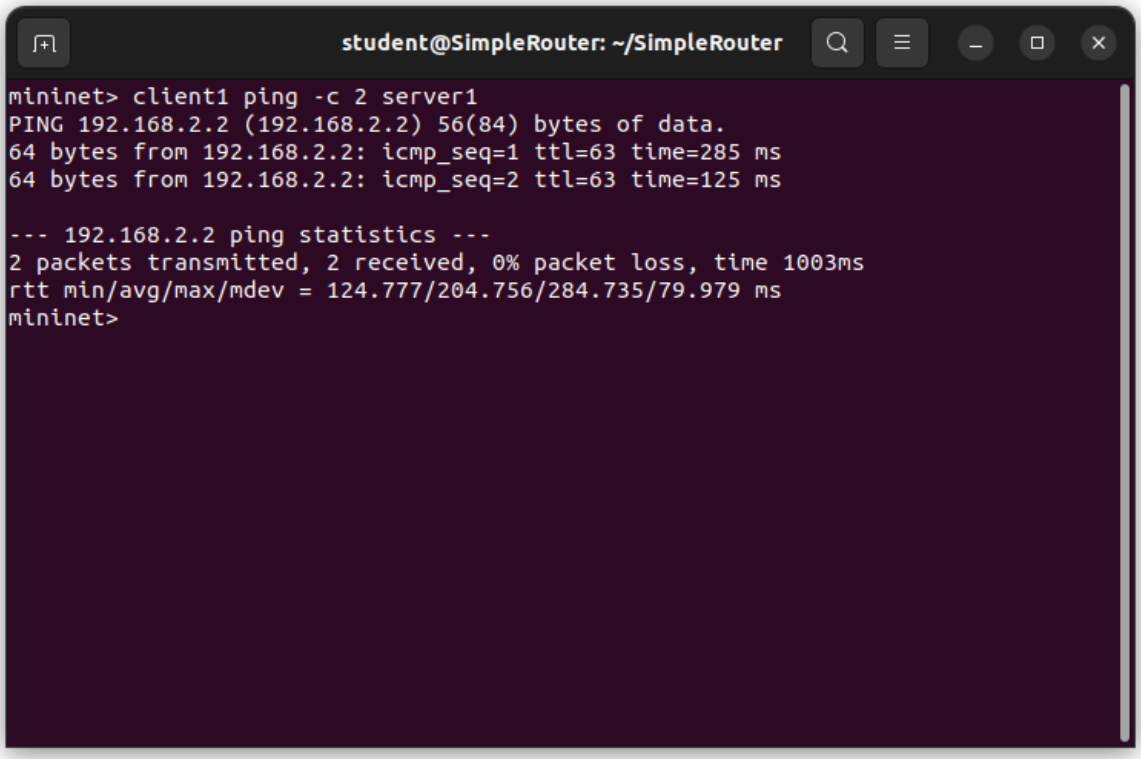
- traceroute

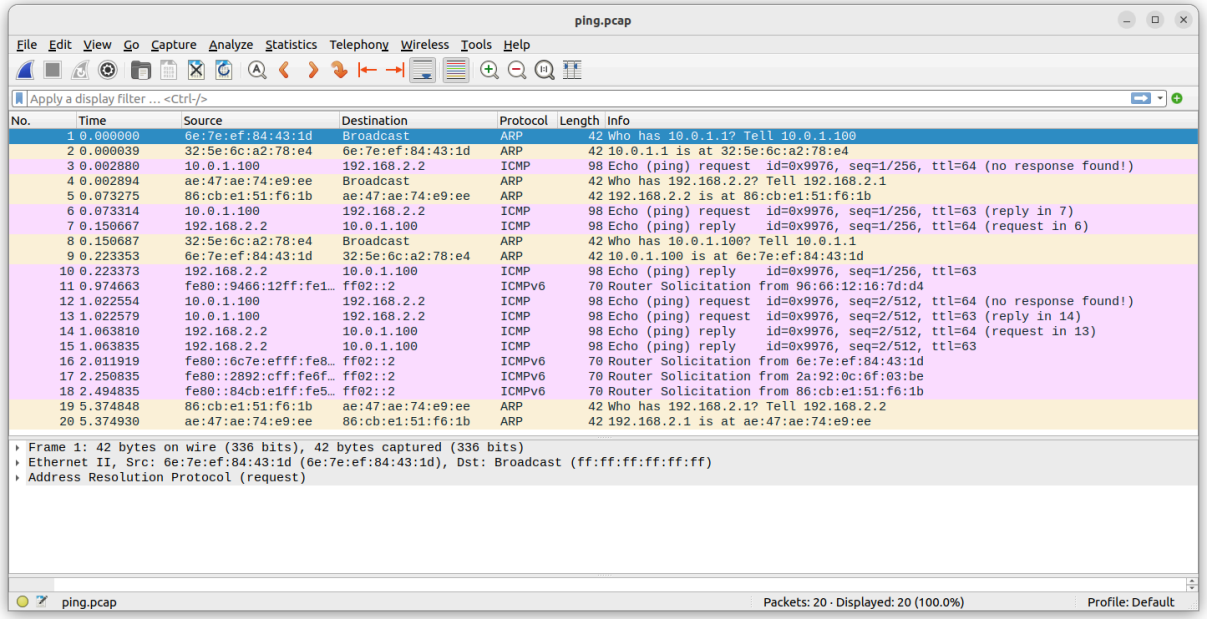

student@SimpleRouter: ~/SimpleRouter
mininet> client1 traceroute server1
traceroute to 192.168.2.2 (192.168.2.2), 30 hops max, 60 byte packets
 1 _gateway (10.0.1.1) 123.410 ms 122.279 ms 121.678 ms
 2 * * *
 3 * * *
 4 * 192.168.2.2 (192.168.2.2) 278.472 ms 278.418 ms
mininet> client1 traceroute server2
traceroute to 172.64.3.10 (172.64.3.10), 30 hops max, 60 byte packets
 1 _gateway (10.0.1.1) 27.118 ms * *
 2 * * *
 3 * * *
 4 * * *
 5 * 172.64.3.10 (172.64.3.10) 580.947 ms 559.495 ms
mininet>

- wget


student@SimpleRouter: ~/SimpleRouter
mininet> client1 wget server1
--2025-06-19 21:12:00-- http://192.168.2.2/
Connecting to 192.168.2.2:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 161 [text/html]
Saving to: ‘index.html’
index.html   100%[===================>]   161 --.-KB/s   in 0s
2025-06-19 21:12:01 (43.7 MB/s) - ‘index.html’ saved [161/161]
mininet> client1 wget server2
--2025-06-19 21:12:04-- http://172.64.3.10/
Connecting to 172.64.3.10:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 161 [text/html]
Saving to: ‘index.html.1’
index.html.1   100%[===================>]   161 --.-KB/s   in 0s
2025-06-19 21:12:05 (42.4 MB/s) - ‘index.html.1’ saved [161/161]
mininet>

ARP



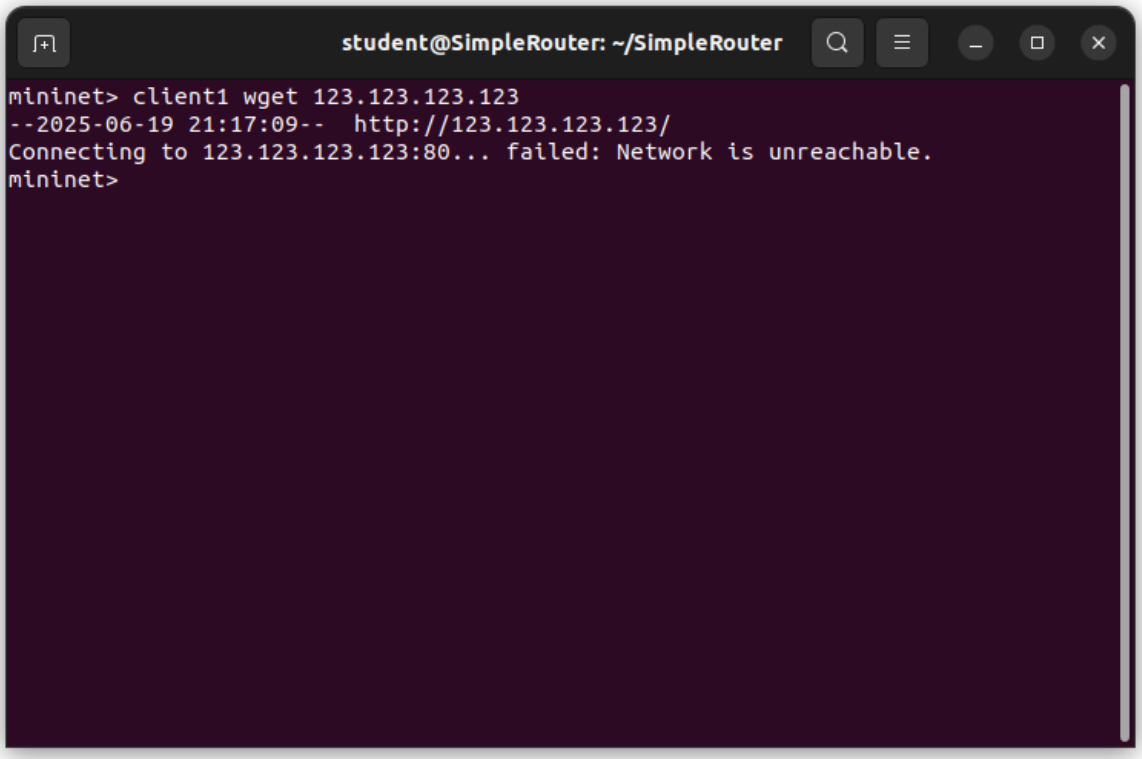


From the two pings issued with the command `client1 ping -c 2 server1` you can confirm that the appropriate ARP requests and replies are exchanged, and that

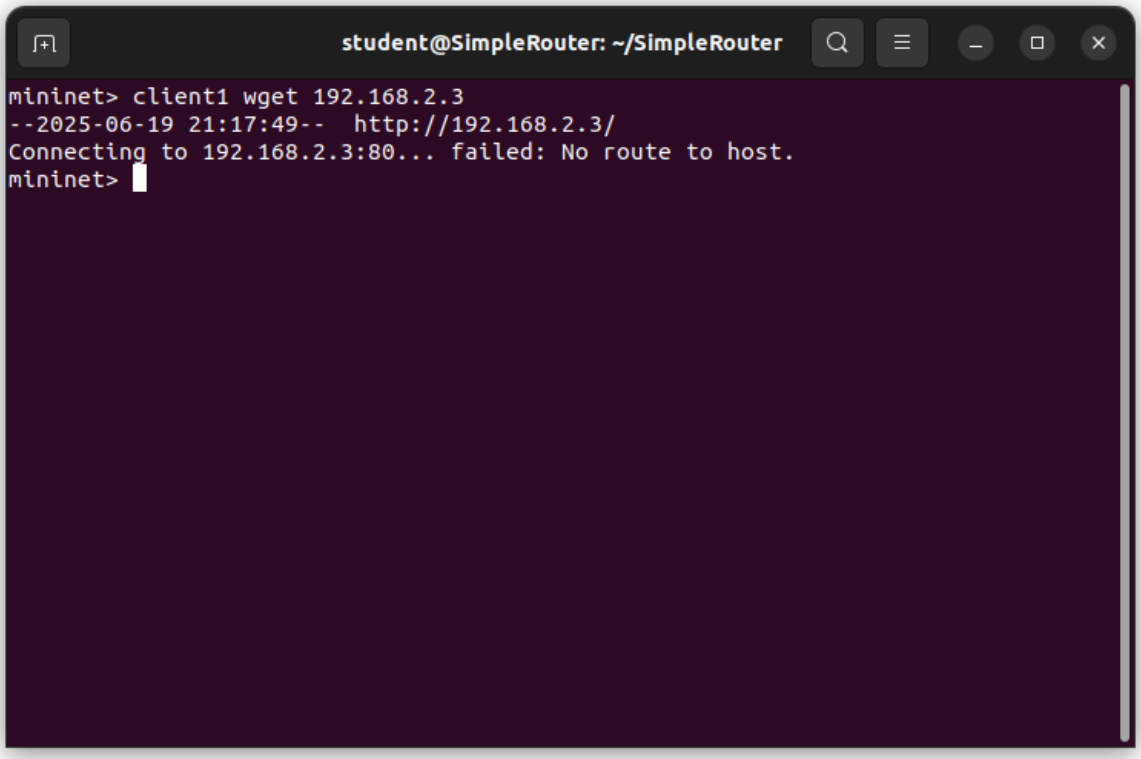
the ARP cache is functioning correctly.

ICMP

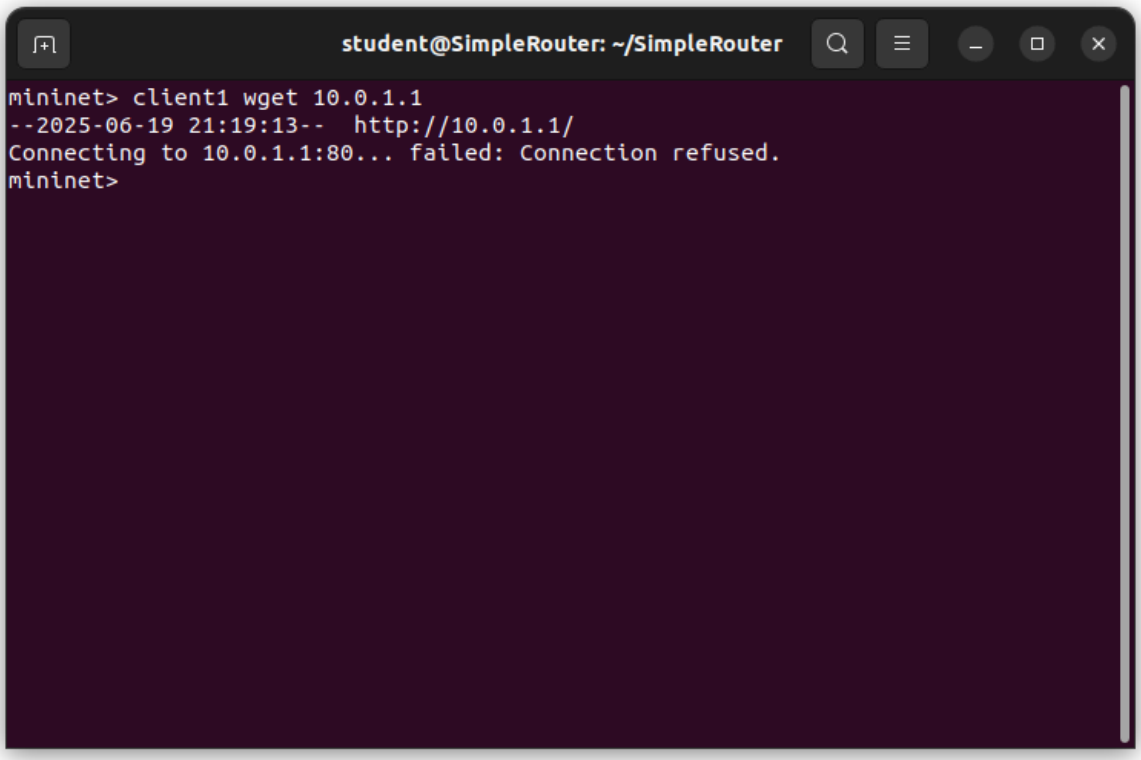
- Network unreachable



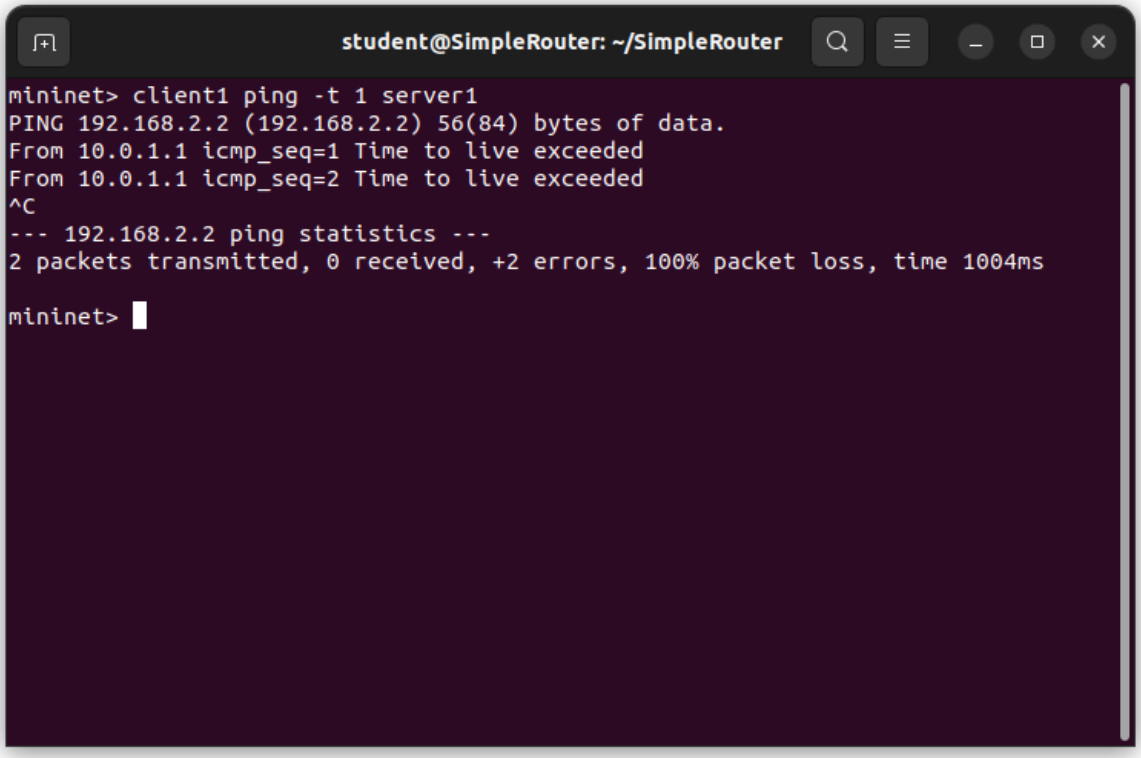
- Host unreachable



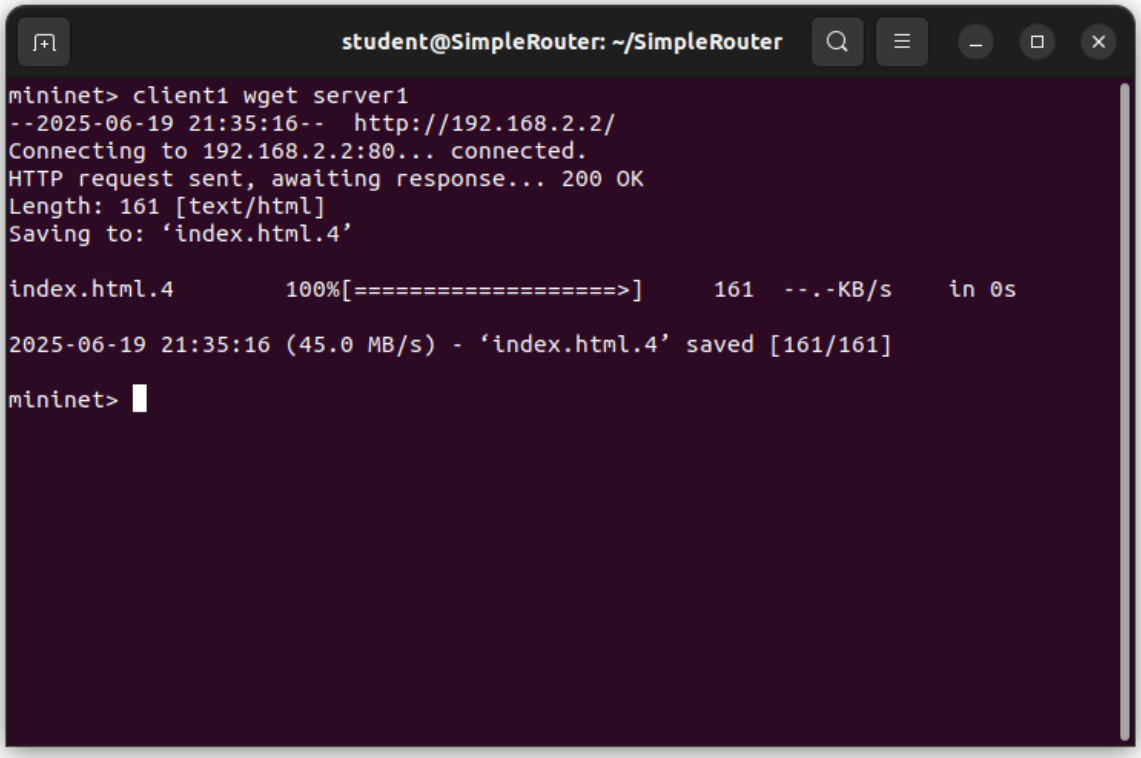
- Port unreachable

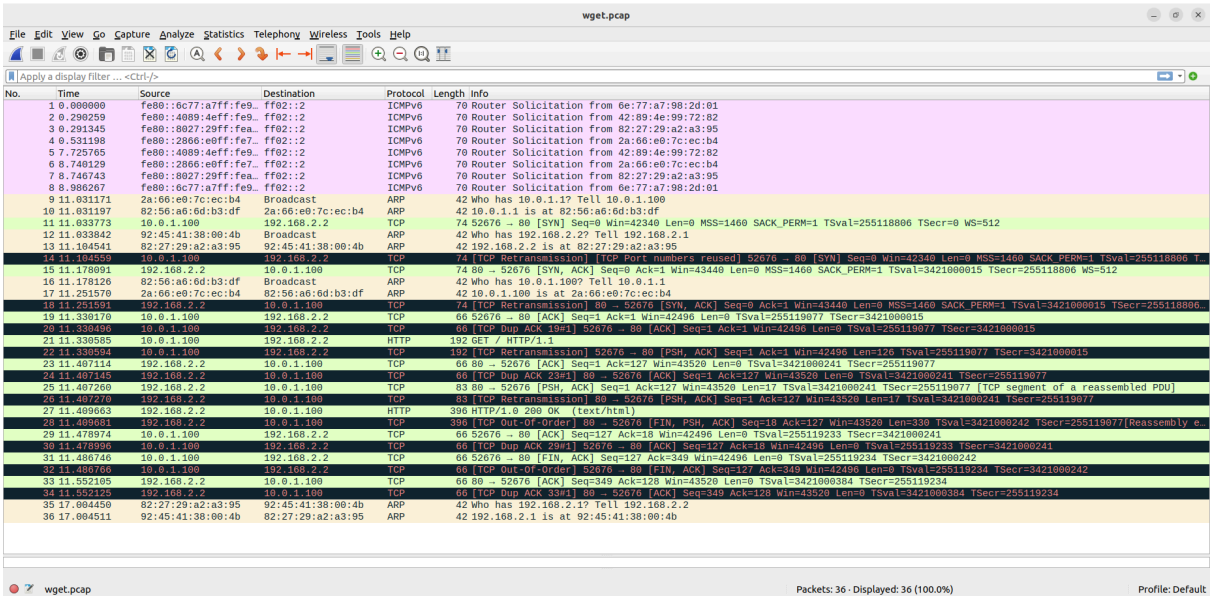


- TTL exceeded



IP

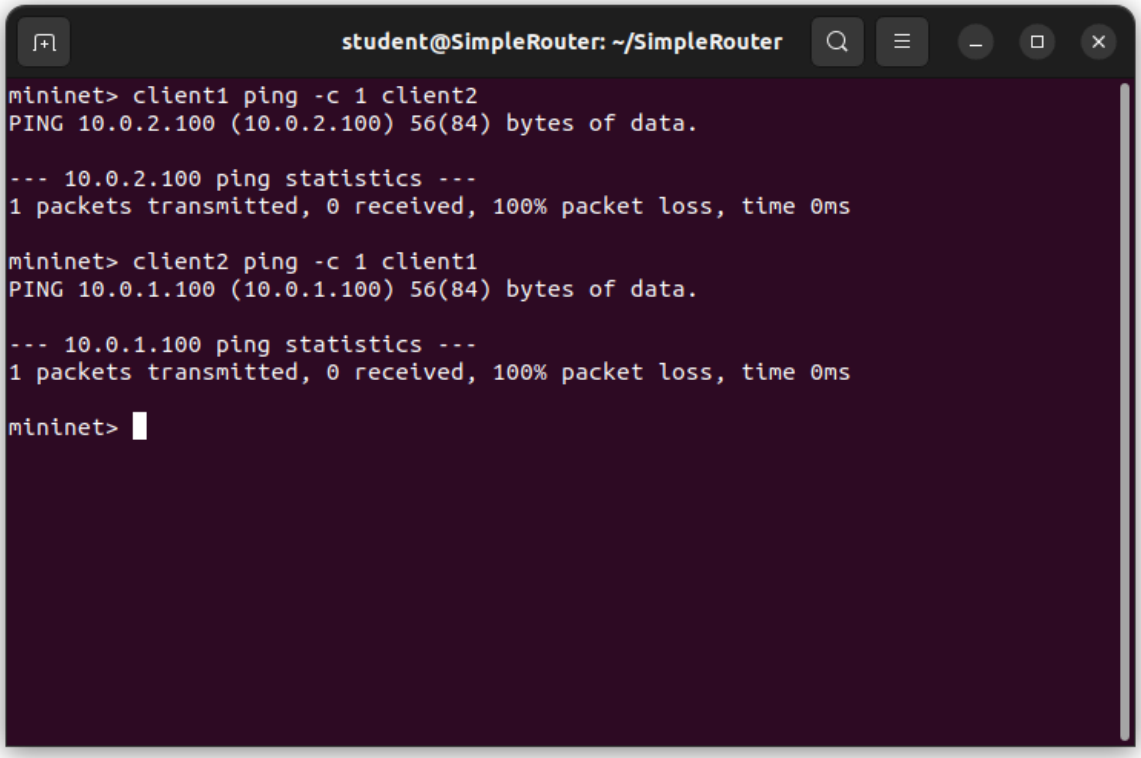


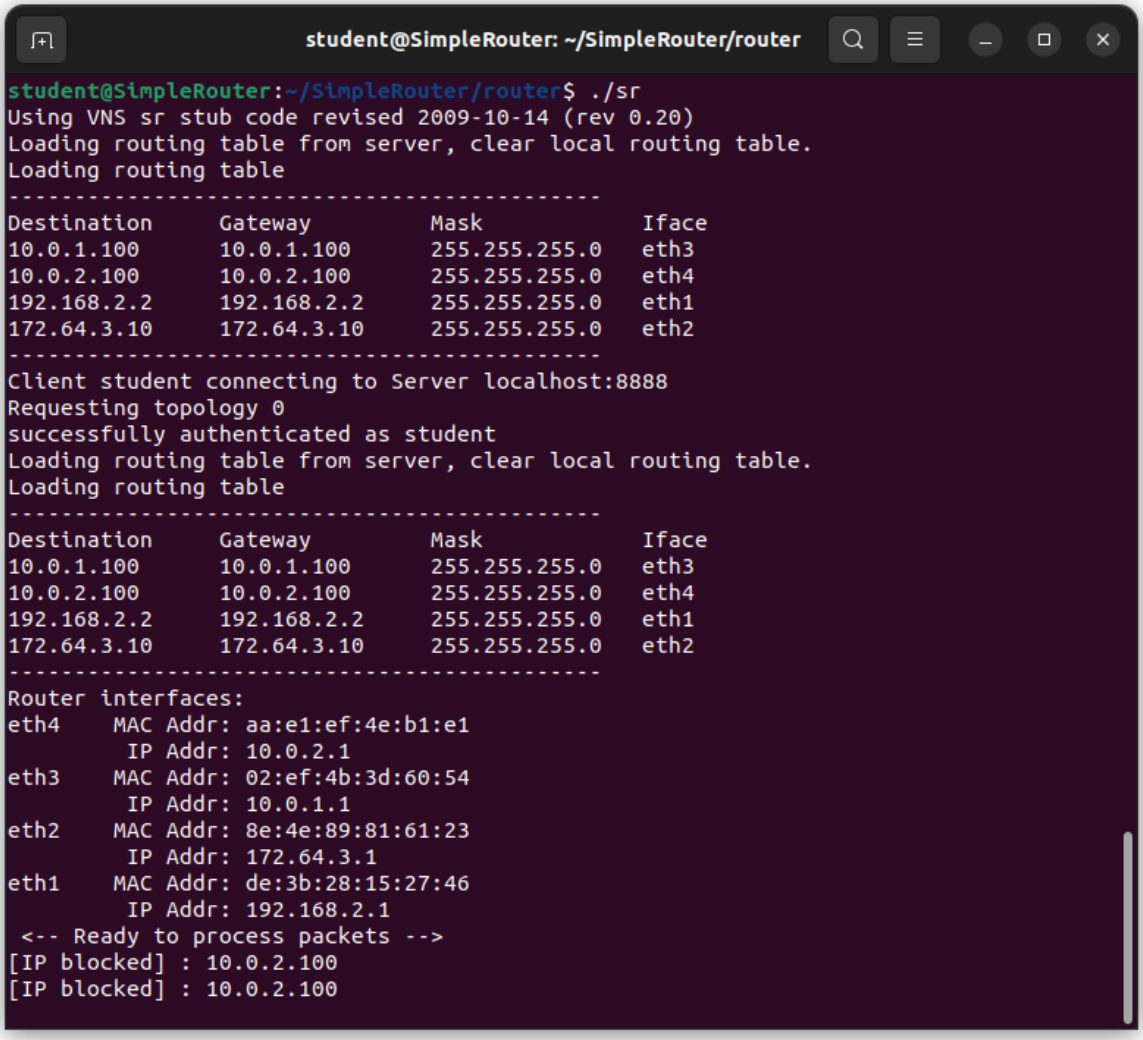


By running the command `client1 wget server1` you can confirm that IP connectivity is working correctly.

Firewall

- Inbound & Outbound


student@SimpleRouter: ~/SimpleRouter
mininet> client1 ping -c 1 client2
PING 10.0.2.100 (10.0.2.100) 56(84) bytes of data.
--- 10.0.2.100 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms
mininet> client2 ping -c 1 client1
PING 10.0.1.100 (10.0.1.100) 56(84) bytes of data.
--- 10.0.1.100 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms
mininet>


student@SimpleRouter: ~/SimpleRouter/router
student@SimpleRouter:~/SimpleRouter/router$ ./sr
Using VNS sr stub code revised 2009-10-14 (rev 0.20)
Loading routing table from server, clear local routing table.
Loading routing table

Destination Gateway Mask Iface
10.0.1.100 10.0.1.100 255.255.255.0 eth3
10.0.2.100 10.0.2.100 255.255.255.0 eth4
192.168.2.2 192.168.2.2 255.255.255.0 eth1
172.64.3.10 172.64.3.10 255.255.255.0 eth2

Client student connecting to Server localhost:8888
Requesting topology 0
successfully authenticated as student
Loading routing table from server, clear local routing table.
Loading routing table

Destination Gateway Mask Iface
10.0.1.100 10.0.1.100 255.255.255.0 eth3
10.0.2.100 10.0.2.100 255.255.255.0 eth4
192.168.2.2 192.168.2.2 255.255.255.0 eth1
172.64.3.10 172.64.3.10 255.255.255.0 eth2

Router interfaces:
eth4 MAC Addr: aa:e1:ef:4e:b1:e1
IP Addr: 10.0.2.1
eth3 MAC Addr: 02:ef:4b:3d:60:54
IP Addr: 10.0.1.1
eth2 MAC Addr: 8e:4e:89:81:61:23
IP Addr: 172.64.3.1
eth1 MAC Addr: de:3b:28:15:27:46
IP Addr: 192.168.2.1
<-- Ready to process packets -->
[IP blocked] : 10.0.2.100
[IP blocked] : 10.0.2.100