ZADANIE 1 – SIECI KOMPUTEROWE

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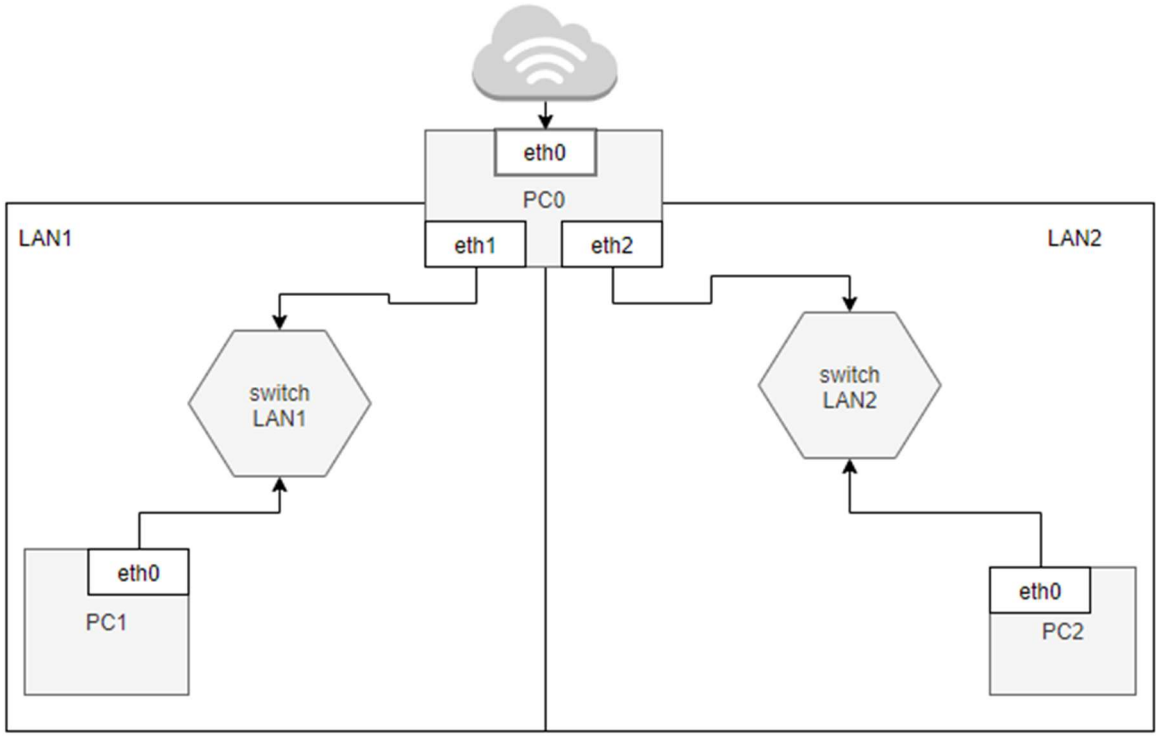



1. Zaprojektuj oraz przygotuj prototyp rozwiązania z wykorzystaniem oprogramowania `VirtualBox` lub podobnego. Zaproponuj rozwiązanie spełniające poniższe wymagania:
   - Usługodawca zapewnia domunikację z siecią internet poprzez interfejs `eth0` `PC0`
   - Zapewnij komunikację z siecią internet na poziomie `LAN1` oraz `LAN2`
   - Dokonaj takiego podziału sieci o adresie `172.22.128.0/17` aby w `LAN1` można było zaadresować `500` adresów natomiast w LAN2 `5000` adresów
   - Przygotuj dokumentację powyższej architektury w formie graficznej w programie `DIA`

WYKONANIE

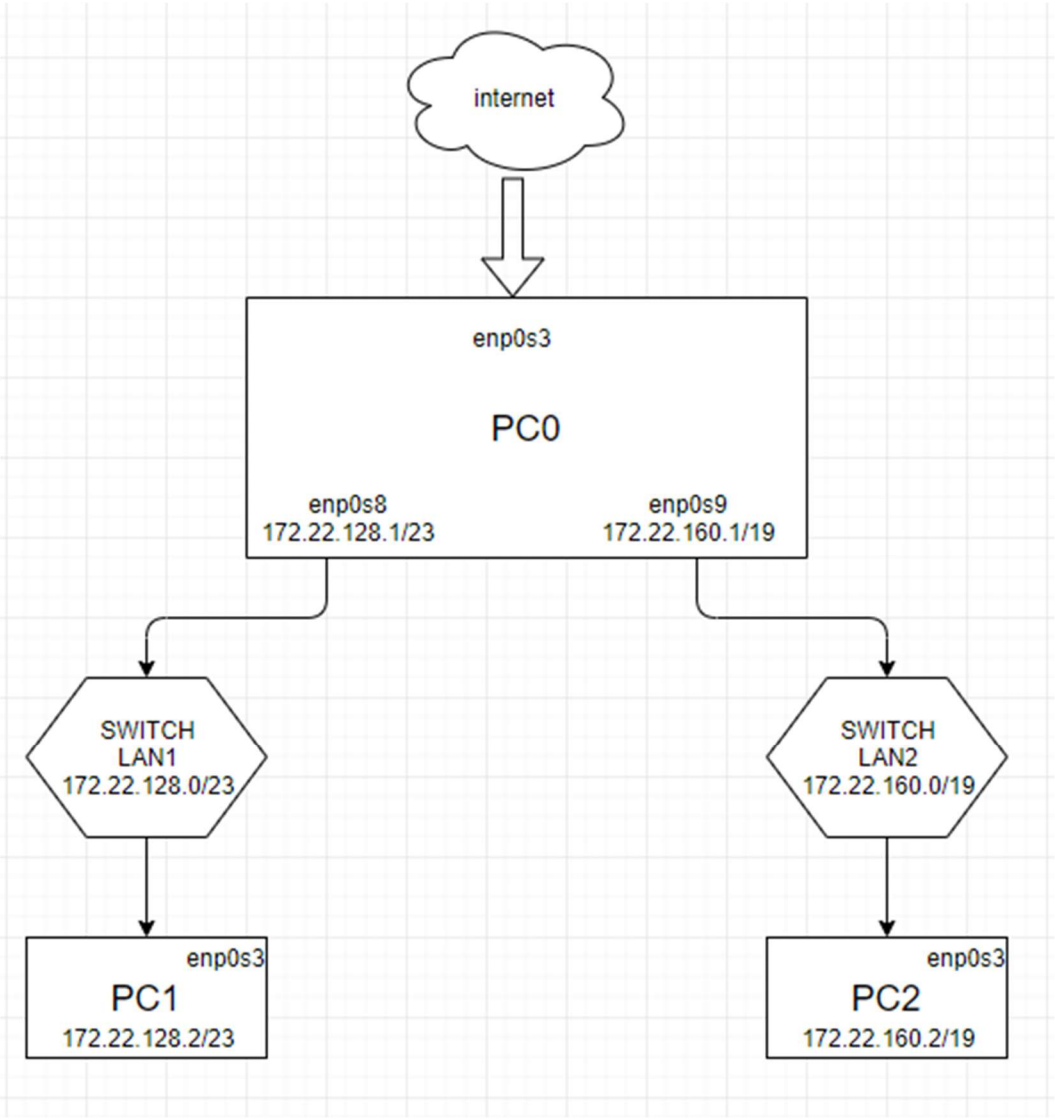
1. Obliczenie maski podsieci dla sieci LAN1 oraz LAN2
   LAN1: 500 hostów, logarytm o podstawie 2 z 500 wynosi 8,96 więc 9 bitów musi być przeznaczonych na hosty. Maska wygląda zatem tak: 255.255.254.0 (510 hostów)
   LAN2: 5000 hostów, logarytm o podstawie 2 z 5000 wynosi 12,28 więc 13 bitów musi być przeznaczonych na hosty. Maska wygląda zatem tak: 255.255.224.0 (8190 hostów)
2. Ustalenie adresów sieci LAN.

   LAN1: 172.128.22/23

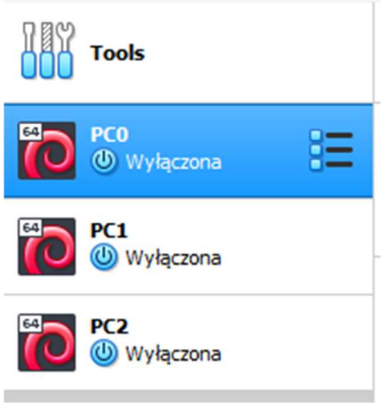
   LAN2: 172.128.160/19

| | | |
|---|---|---|
| 172.22.128.0 | 172.22.128.1 - 172.22.159.254 | 172.22.159.255 |
| 172.22.160.0 | 172.22.160.1 - 172.22.191.254 | 172.22.191.255 |

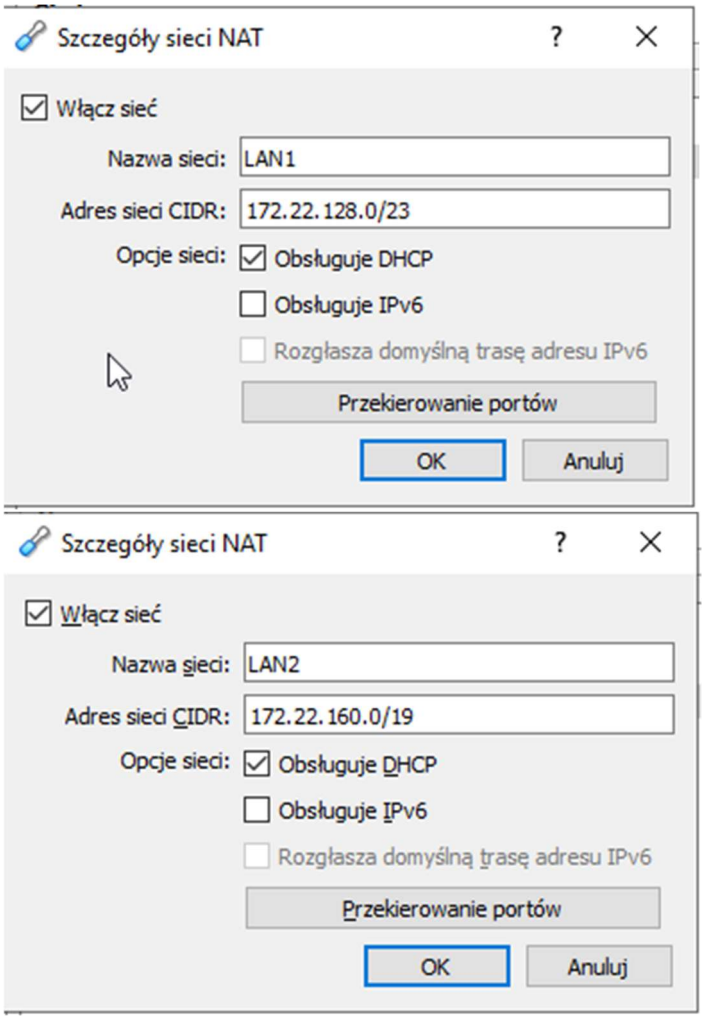
3. Diagram arichektury




4. Utworzenie trzech maszyn wirtualnych w VirtualBox

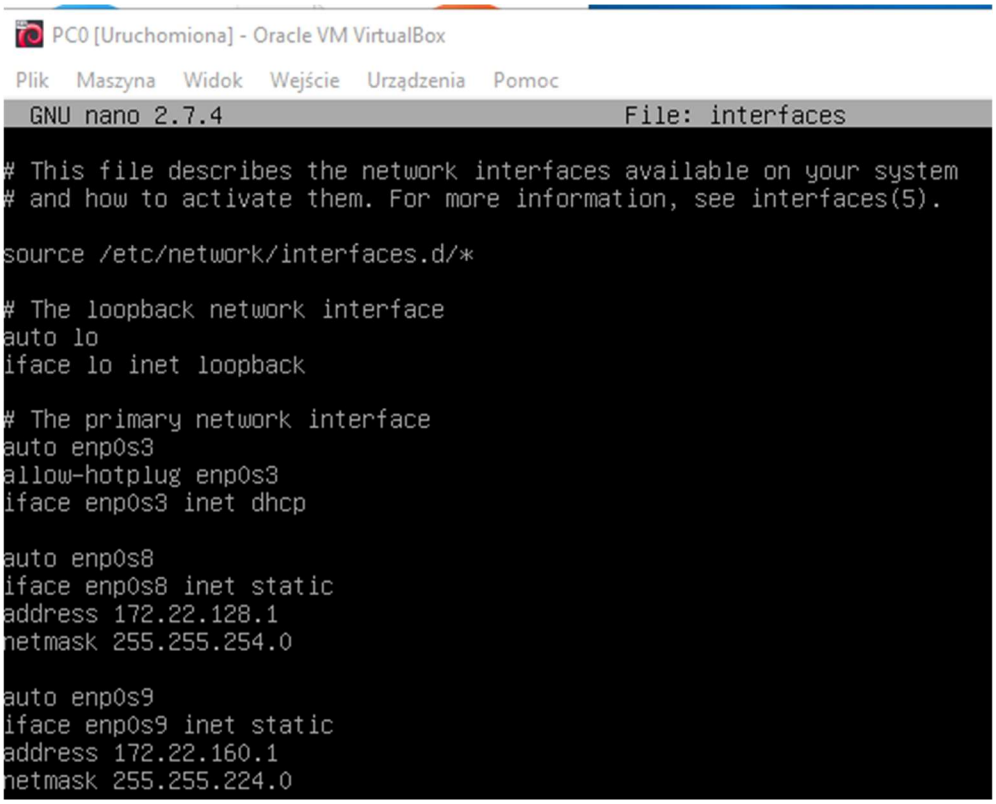


5. Utworzenie Sieci LAN1 i LAN2

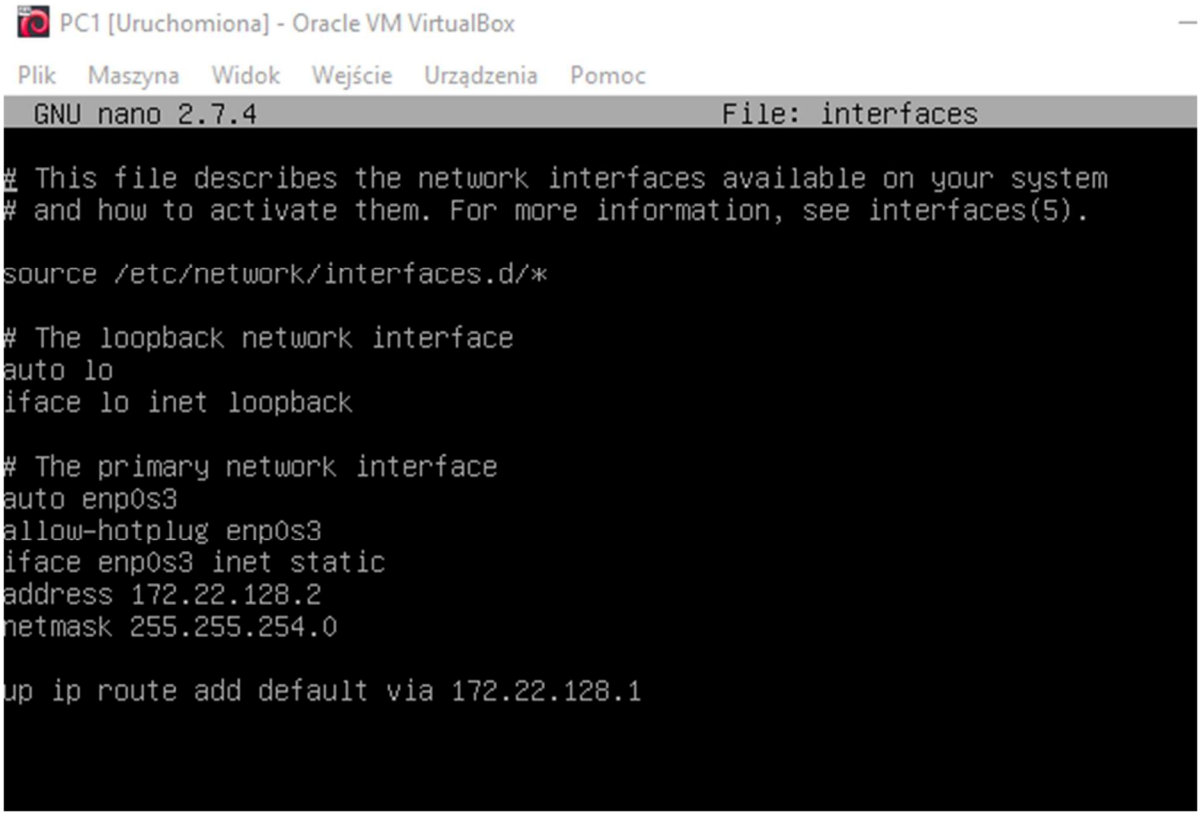



6. Podłączenie maszyn do sieci zgodnie z wytycznymi.
   PC0 – sieć NAT, LAN1, LAN2
   PC1 - LAN1
   PC2 – LAN2

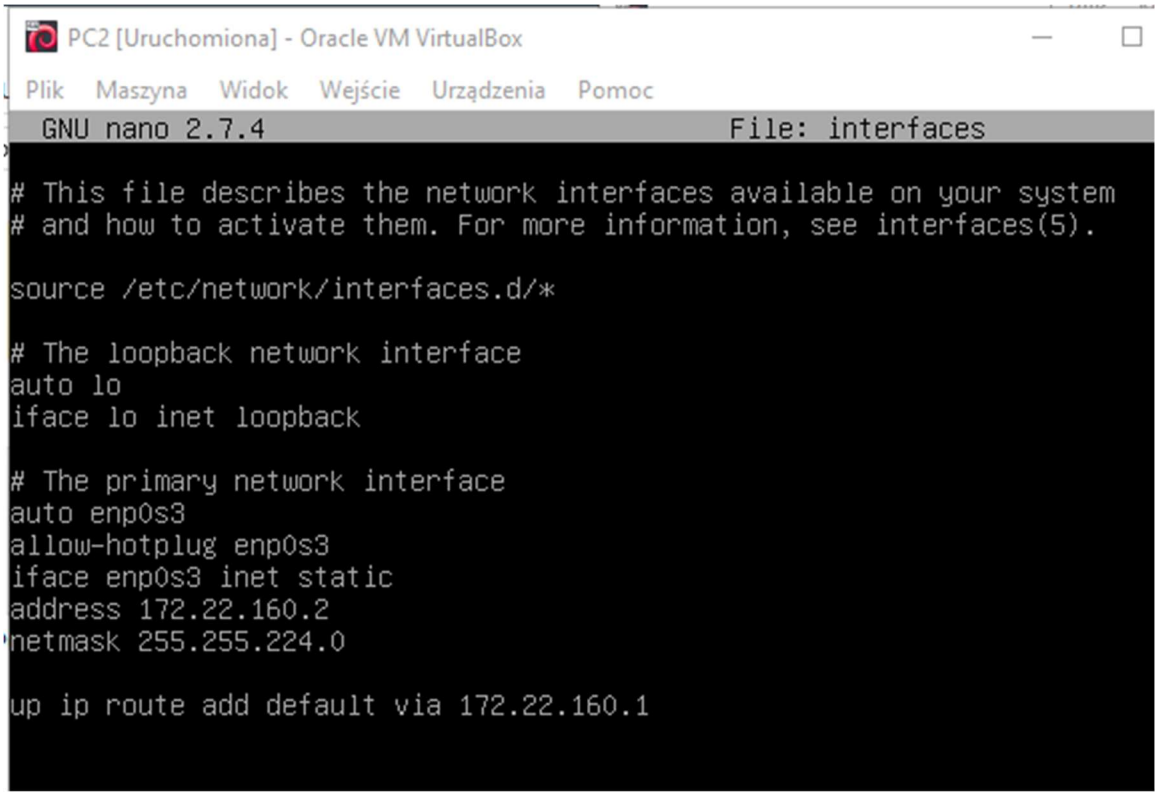
7. Konfiguracja PC0




8. Konfiguracja PC1 (adresowanie + routing)



9. Konfiguracja PC2 (adresowanie + routing)



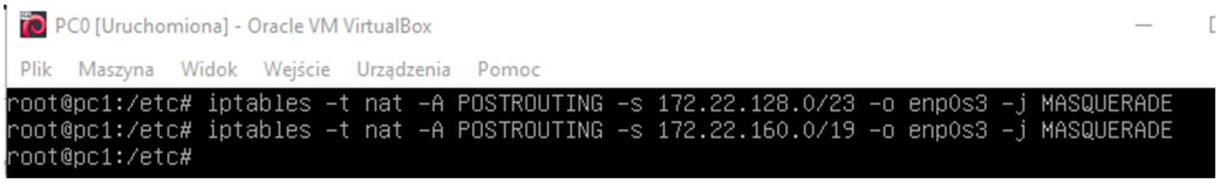

10. PC0 – włączenie forward pakietów

```
root@pc1:/# echo 1 > /proc/sys/net/ipv4/ip_forward
```

11. Odkomentowanie linijki w pliku /etc/sysctl.d/99-sysctl.conf, aby forward był zawsze włączony.

```
# Uncomment the next line to enable packet forwarding for IPv4
net.ipv4.ip_forward=1
```

12. PC0 – dodanie masquerade, zapisanie reguł w iptables.up.rules oraz update iptables.up.rules, aby reguły były zawsze wczytywane




```
root@pc1:/etc# iptables-save > /etc/iptables.up.rules
```

```
# Generated by iptables-save v1.6.0 on Sun Jun  9 23:24:51 2019
*nat
:PREROUTING ACCEPT [0:0]
:INPUT ACCEPT [0:0]
:OUTPUT ACCEPT [0:0]
:POSTROUTING ACCEPT [0:0]
-A POSTROUTING -s 172.22.128.0/23 -o enp0s3 -j MASQUERADE
-A POSTROUTING -s 172.22.160.0/19 -o enp0s3 -j MASQUERADE
COMMIT
# Completed on Sun Jun  9 23:24:51 2019
post-up iptables-restore < /etc/iptables.up.rules
```

13. PC1, PC2 – dodanie adresów dns nameserver 1.1.1.1 w pliku /etc/resolv.conf

14. Na koniec test pingów

```
root@pc1:/etc# ping google.com
PING google.com (172.217.22.78) 56(84) bytes of data.
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=1 ttl=56 time=52.3 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=2 ttl=56 time=53.1 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=3 ttl=56 time=53.9 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=4 ttl=56 time=55.7 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=5 ttl=56 time=52.0 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=6 ttl=56 time=51.6 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=7 ttl=56 time=51.0 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=8 ttl=56 time=51.8 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=9 ttl=56 time=50.9 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=10 ttl=56 time=51.7 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=11 ttl=56 time=55.2 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=12 ttl=56 time=50.9 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=13 ttl=56 time=52.1 ms
^C
--- google.com ping statistics ---
13 packets transmitted, 13 received, 0% packet loss, time 12019ms
rtt min/avg/max/mdev = 50.930/52.520/55.714/1.511 ms
root@pc1:/etc# _
```

```
root@pc1:/etc# ping google.com
PING google.com (172.217.22.78) 56(84) bytes of data.
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=1 ttl=56 time=50.7 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=2 ttl=56 time=51.1 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=3 ttl=56 time=50.5 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=4 ttl=56 time=51.4 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=5 ttl=56 time=54.0 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=6 ttl=56 time=51.7 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=7 ttl=56 time=51.9 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=8 ttl=56 time=51.2 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=9 ttl=56 time=52.0 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=10 ttl=56 time=50.5 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=11 ttl=56 time=51.9 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=12 ttl=56 time=52.0 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=13 ttl=56 time=50.3 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=14 ttl=56 time=64.7 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=15 ttl=56 time=51.2 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=16 ttl=56 time=50.9 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=17 ttl=56 time=51.1 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=18 ttl=56 time=50.5 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=19 ttl=56 time=51.1 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=20 ttl=56 time=51.7 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=21 ttl=56 time=52.6 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=22 ttl=56 time=51.5 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=23 ttl=56 time=50.7 ms
64 bytes from fra15s17-in-f78.1e100.net (172.217.22.78): icmp_seq=24 ttl=56 time=50.7 ms
^C
--- google.com ping statistics ---
24 packets transmitted, 24 received, 0% packet loss, time 23041ms
rtt min/avg/max/mdev = 50.336/51.952/64.704/2.794 ms
root@pc1:/etc#
```