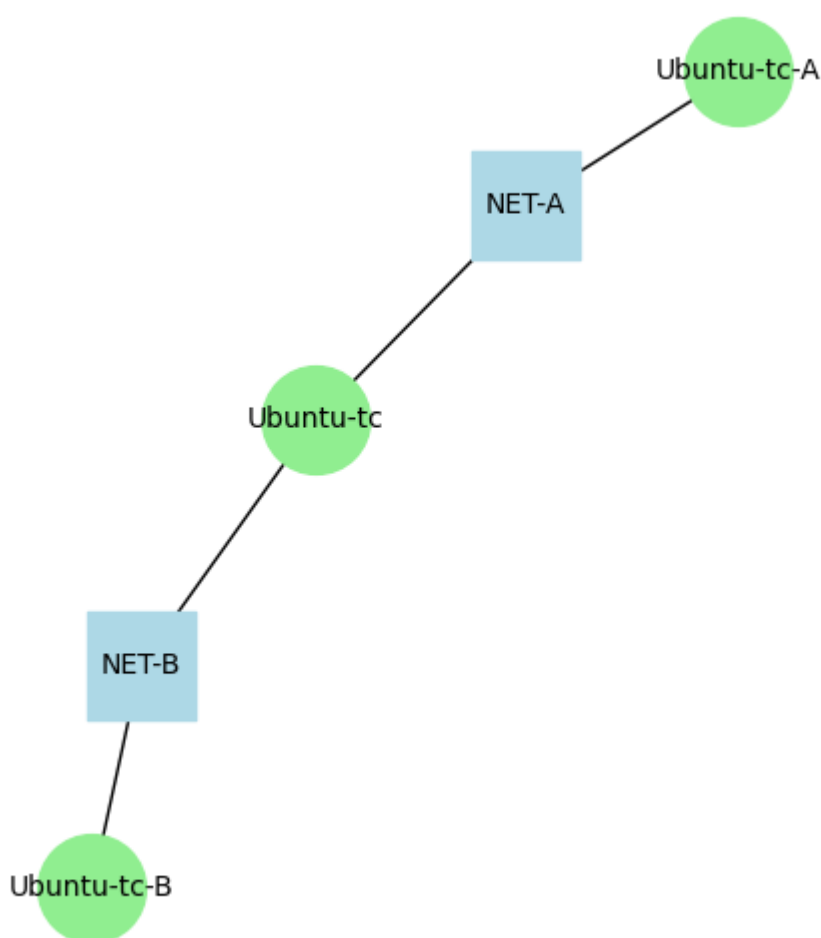


TC linux - ograniczanie pasma oraz indukowanie błędów w transmisji

programy wykorzystane do zrobienia pomiarów:

- <https://man7.org/linux/man-pages/man8/tc.8.html>
- <https://github.com/tum-lkn/tcgui>

Schemat Połączeniowy



Schemat wygenerowany za pomocą [mojego skryptu](#)

Nazwa maszyny	Karta sieciowa	Adres ip	brama	Switch wirtualny
ubuntu-tc	eth0	192.168.1.1/24	X	NET-A
	eth1	192.168.2.1/24	X	NET-B
ubuntu-tc-A	eth0	192.168.1.10/24	192.168.1.1/24	NET-A
ubuntu-tc-B	eth0	192.168.2.10/24	192.168.2.1/24	NET-B

Ustawienia na maszynie "Ubuntu-tc"

- włączenie forwardingu dla ipv4

```
echo "net.ipv4.ip_forward=1" | sudo tee -a /etc/sysctl.conf
```

- zrestartuj interfejsy sieciowe
- skopiowanie tc-gui na maszynę oraz uruchomienie

```
sudo apt install git
git clone https://github.com/tum-lkn/tcgui
cd tcgui
sudo python3 main.py --ip 127.0.0.1
```

- Otwieramy w przeglądarce firefox adres 127.0.0.1:5000

TCGUI - 4 Available Interfaces

eth0 (192.168.1.1)
eth1 (192.168.2.1)
eth2 (172.30.16.210)
lo (127.0.0.1)

eth0 (192.168.1.1)

Name	Current Value	New Value	Variance / Correlation	New Value
Rate	None	mbit		
Delay	None	ms	±None	± ms
Loss	None	%	None	%
Duplicate	None	%		
Reorder	None	%	None	%
Corrupt	None	%		
Limit	None			

[Apply eth0 \(192.168.1.1\) Rules](#)

[Remove eth0 \(192.168.1.1\) Rules](#)

Ustawienia na reszcie maszyn

```
sudo apt-get update
sudo apt-get install iperf3
```

Musimy je jeszcze zaadresować statycznie za pomocą GUI albo za pomocą netplan

Podstawowe testy opóźnień

Test bez dodanego opóźnienia

The image shows two terminal windows side-by-side, representing two different Ubuntu machines, tc-A and tc-B. Both terminals show the same sequence of commands and output, indicating identical configurations and test results.

Terminal tc-A:

```
administrator@ubuntu-tc-A:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 10
    link/ether 00:15:5d:38:01:34 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.10/24 brd 192.168.1.255 scope global noprefixroute eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::f508:9497:bd13:ebc7/64 scope link noprefixroute
        valid_lft forever preferred_lft forever

administrator@ubuntu-tc-A:~$ ping -c 10 192.168.2.10
PING 192.168.2.10 (192.168.2.10) 56(84) bytes of data:
64 bytes from 192.168.2.10: icmp_seq=1 ttl=63 time=0.553 ms
64 bytes from 192.168.2.10: icmp_seq=2 ttl=63 time=1.35 ms
64 bytes from 192.168.2.10: icmp_seq=3 ttl=63 time=0.891 ms
64 bytes from 192.168.2.10: icmp_seq=4 ttl=63 time=1.08 ms
64 bytes from 192.168.2.10: icmp_seq=5 ttl=63 time=1.05 ms
64 bytes from 192.168.2.10: icmp_seq=6 ttl=63 time=0.914 ms
64 bytes from 192.168.2.10: icmp_seq=7 ttl=63 time=1.38 ms
64 bytes from 192.168.2.10: icmp_seq=8 ttl=63 time=1.68 ms
64 bytes from 192.168.2.10: icmp_seq=9 ttl=63 time=1.20 ms
64 bytes from 192.168.2.10: icmp_seq=10 ttl=63 time=1.31 ms

--- 192.168.2.10 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9049ms
rtt min/avg/max/ndev = 0.553/1.131/1.599/0.284 ms
administrator@ubuntu-tc-A:~$
```

Terminal tc-B:

```
administrator@ubuntu-tc-B:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 00:15:5d:38:01:35 brd ff:ff:ff:ff:ff:ff
    inet 192.168.2.10/24 brd 192.168.2.255 scope global noprefixroute eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::8a5a:1f0c:3277:ec52/64 scope link noprefixroute
        valid_lft forever preferred_lft forever

administrator@ubuntu-tc-B:~$ ping -c 10 192.168.1.10
PING 192.168.1.10 (192.168.1.10) 56(84) bytes of data:
64 bytes from 192.168.1.10: icmp_seq=1 ttl=63 time=0.559 ms
64 bytes from 192.168.1.10: icmp_seq=2 ttl=63 time=0.505 ms
64 bytes from 192.168.1.10: icmp_seq=3 ttl=63 time=0.380 ms
64 bytes from 192.168.1.10: icmp_seq=4 ttl=63 time=0.734 ms
64 bytes from 192.168.1.10: icmp_seq=5 ttl=63 time=0.583 ms
64 bytes from 192.168.1.10: icmp_seq=6 ttl=63 time=0.864 ms
64 bytes from 192.168.1.10: icmp_seq=7 ttl=63 time=0.580 ms
64 bytes from 192.168.1.10: icmp_seq=8 ttl=63 time=0.582 ms
64 bytes from 192.168.1.10: icmp_seq=9 ttl=63 time=0.935 ms
64 bytes from 192.168.1.10: icmp_seq=10 ttl=63 time=0.920 ms

--- 192.168.1.10 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9171ms
rtt min/avg/max/ndev = 0.380/0.664/0.935/0.178 ms
administrator@ubuntu-tc-B:~$
```

Inne Testy

Parametry tc

Wykonanie testu

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