

Practical Exercises  
**Communication Systems (Rechnernetze II)**  
Topic 19: QoS

Work in groups of 2 notebooks, you can use your own notebook, too.

**Exercise 1:**

For testing bandwidth we will use netcat utility (issue *man netcat* for info).

**Laptop B:**

```
netcat -l -p 1234 > /dev/null
```

**Laptop A:**

```
dd if=/dev/zero bs=1024k count=10240 | time netcat DST 1234
```

where *DST* is the ipaddress of laptop B.

It's important that laptop B at first types in the commands so that laptop A can send data and the connection won't be refused.

If you try to ping each other while sending what do you observe compared to ping without sending data?

**Exercise 2:**

In this exercise we want to limit the speed of our connection to about 100Kbps. We should use Hierarchy Token Bucket (HTB) which is a queueing discipline that allows shaping. For just limiting speed, you can attach qdisc to the root node and set rate for HTB to 100Kbps.

Use the following commands on laptop A:

```
//we build this structure:
                1:0  root  qdisc
                |
                1:1
                |
                |
                |
                |
                1:10

//add root node
tc qdisc add dev eth1 root handle 1:0 htb default 10
// add children nodes
tc class add dev eth1 parent 1:0 classid 1:1 htb rate 100kbit ceil
100kbit
tc class add dev eth1 parent 1:1 classid 1:10 htb rate 100kbit ceil
100kbit
//mark packets
iptables -A POSTROUTING -t mangle -o eth1 -p all -j MARK --set-mark 10
```

```
tc filter add dev eth1 parent 1: prio 0 protocol all handle 10 fw
classid 1:10
```

Now try again:

**Laptop B:**

```
netcat -l -p 1234 > /dev/null
```

**Laptop A:**

```
dd if=/dev/zero bs=1024k count=10240 \ time netcat DST 1234
```

where *DST* is the ipaddress of laptop B.

What do you observe if you try to ping now?

At the end delete everything by using:

```
tc qdisc del dev eth1 root
```

```
iptables -t mangle -F
```

**Exercise 3:**

In this exercise we will observe, what happens if we download and upload at the same time.

At first use again the commands:

**laptop B:**

```
netcat -l -p 1234 > /dev/null
```

**laptop A:**

```
dd if=/dev/zero bs=1024k count=10240 \ time netcat DST 1234
```

Now laptop A should download a file with `wget ftp://192.168.10.100/test`

By using `iptables` you can try to speed up your connections by using

```
iptables -A OUTPUT -t mangle -p tcp - -tcp-flags SYN,ACK,FIN,RST ACK -j MARK - -set-mark 1
```