

Quality of Service in IP Networks: An Experimental Approach

The global outcomes of this project consist of the following:

- Analyze the constraints of applications such as video transmission
- Analyze the impact of traffic shaping
- Deploy a DiffServ architecture and tune the configuration parameters
- Analyze the impact of QoS mechanisms in congestion scenarios

The description of the project and the tasks is available for download on Moodle.

-. Hardware



Figure 1. GL-iNet 6461 wireless router



Figure 2. TP-Link WR741nd wireless router

-. Software

The following tools can help in assessing the QoS on the platform:

Install and compile netperf:

```
wget https://github.com/HewlettPackard/netperf/archive/master.zip
unzip master .zip
cd netperf-master/
./configure --enable-demo=yes
make
make install
```

Install matplotlib and fping

```
apt-get install fping
apt-get install python-qt4
pip install matplotlib
```

Install flent

```
pip install flent
```

Install VLC as in this [tutorial](#).

-. Addressing

the addressing plan of the platform is shown in Fig. 2. Both routers have static addresses on their wan and lan interfaces. DHCP is activated on the LAN interfaces and static leases are configured so as to obtain the addresses on the terminals according to the figure.

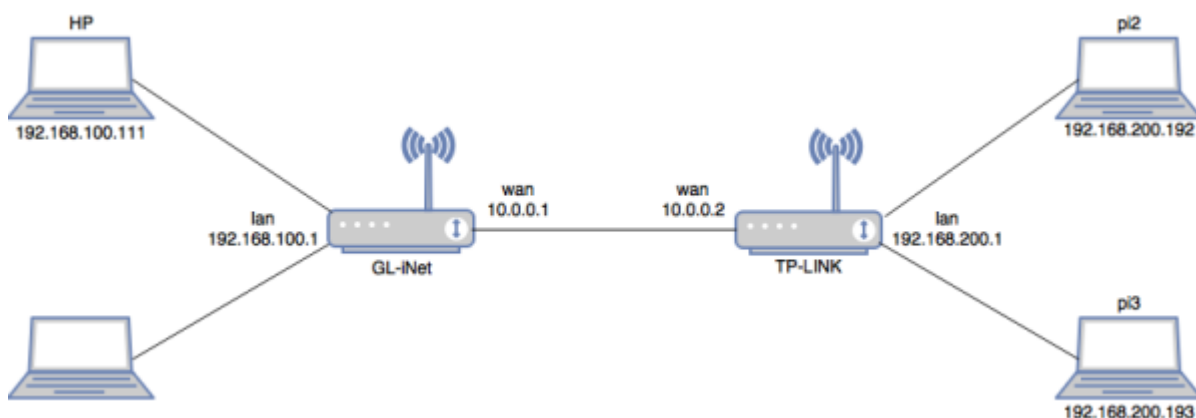


Figure 2. Addressing plan for QoS platform

-. Access and Configuration

SSH is activated on the two Raspberry Pi devices connected to the TP-LINK router. Thus, they can be accessed by typing `ssh -l pi ip_address` on any terminal. The default password is raspberry and the pi user is a sudoer. For advanced debugging, an HDMI cable is available so you can connect the Pi to a display monitor.

For both routers, SSH is also activated, and they can be accessed by any SSH client on the platform. For easiness, you can also connect to the WiFi interfaces (OpenWrt and GL-iNet SSID) and configure the routers from your personal laptop. The root password for GL-iNet is helloworld, while no password is set for OpenWrt.



Before you leave, make sure to go through the following steps.

- Gracefully shutdown the raspberry pi modules with `shutdown -h now`.



- Switch off the TP-LINK and remove the USB power cable from the GL-iNet.
- Power off the laptop.

-. [CO1] Connecting the Platform

Describe and analyze the basic steps for ensuring the platform connectivity: addressing and routing



- Accomplished
 - Enable end-to-end communication
 - Analyse the addressing and routing (routing tables, DHCP, etc.)
- Exceeded
 - Identify the necessary commands and configurations for enabling end-to-end communication

Routing table of GL-iNet:

```
10.0.0.0/24 dev eth0 proto kernel scope link src 10.0.0.1 # Loopback
address
192.168.8.0/24 dev wlan0 proto kernel scope link src 192.168.8.1 #
connection to the wifi interface
192.168.100.0/24 dev eth1 proto kernel scope link src 192.168.100.1 #
connection to our LAN 192.168.100.0/24 (HP is part of this network)
192.168.200.0/24 via 10.0.0.2 dev eth0 proto static # static route to the
192.168.200.0/24 network via the interface
10.0.0.2 of the TP-LINK router
```

Routing table of GL-iNet:

```
10.0.0.0/24 dev eth1 src 10.0.0.2 # connection to directly connected
network 10.0.0.0/24
192.168.100.0/24 via 10.0.0.1 dev eth1 # static route to the network
192.168.100.0/24 via the interface
10.0.0.1 of the GL-iNet router
192.168.200.0/24 dev br-lan src 192.168.200.1 # connection to our LAN
192.168.200.0/24
```

#Configuration of LAN interface :

```
config interface 'lan'
    option type 'bridge'
    option ifname 'eth0'
    option proto 'static'
    option ipaddr '192.168.200.1'
    option netmask '255.255.255.0'
    option ip6assign '60'
```

#Configuration of WAN interface :

```
config interface 'wan'
    option ifname 'eth1'
#    option proto 'dhcp'
    option proto 'static'
    option ipaddr '10.0.0.2'
    option netmask '255.255.255.0'
```

#Configuration of the static route :

```
config route
    option interface 'wan'
    option target '192.168.100.0'
    option netmask '255.255.255.0'
    option gateway '10.0.0.1'
```

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