

Optimisation del ancho de banda



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(on behalf of INASP)

Agenda

- Participants introduction
- Brief description of each other network
- Traffic type classification (by use and by bandwidth requirements)
- Lab setup
- Overview/Installation of the instruments you can use to optimize the bandwidth usage
 - Demos and Exercises with most of the elements
- Review of each other network in light of what we have learned in this workshop

Introductions ...

Let's share a bit of our experiences

- Please
 - Let's take note of each other network as if you were going to take ownership and responsibility for the network.
 - You'll be asked questions about other networks, therefore ask questions if something is not clear in the explanations/descriptions.
 - How would you optimize it?
 - ...

Can everyone understand written English?

(99% of online technical documentation is in English)

Before we start ... (1/4)

- Do we all know ...
 - ... what is an IP address, a Netmask and a Broadcast address?
 - ... the difference between public IP addresses and private IP addresses?
 - ... the difference between an IP address and a MAC address?
 - ... the difference between a hub, a switch and a router?
 - ... what NAT is used for?

Before we start ... (2/4)

- **The taller is entirely based on Open Source software.**
- Is it clear to everyone what Open Source means?
- Does everyone have experience with Open Source?
- Does everyone have experience with Linux as a **USER** (command line interface, text editors, open source software, etc)?
 - What distributions?
- Does everyone have experience with Linux (or other Unix flavors) as administrator?
 - Installing applications (tar.gz, .rpm (-i, -qi, -qf, -ql)/yum, ...)
 - Configuring servers (email, file, web, DNS, ...) ?

Before we start ... (3/4)

- Does anyone know how to configure a Linux router?
 - Plugging in a new Network Interface Card
 - Configuring Routing and/or Bridging
 - Etc
- Do we all know what ***ping*** and ***traceroute*** are and are used for?
- How about ***ifconfig***, ***route***, ***ip***, ***tc*** ...?
- The role of ***/etc/resolv.conf***
- ...

Before we start ... (4/4)

- This is NOT:
 - a workshop on network security
 - a workshop on Linux/Unix system/network administration
 - an advanced workshop on BMO.
- The basics on Networking and Linux (as a user and as admin) are necessary. However, we will quickly review few basic concepts just in case.
 - The lab setup should take no more than 15 minutes ... but ...

Entonces ...

- The focus of this workshop is BMO with Open Source tools/software.
- In the case of a future advanced (longer) taller of BMO, how useful or necessary do you think a pre-training on generic Linux system administration would be?

Commercial Hardware/Software versus OpenSource Software

- If you are not using OpenSource SW, what are the main reasons?
 -
 -
 -
- What Commercial HW/SW are you using mainly?
 -
 -
 -
 - Why did you choose these brands

A couple of examples ...

Email

- Local email server/s VS Remote/external email server/s
 - Local
 - PROS:
 -
 - AGAINST:
 -
 - External
 - PROS:
 -
 - AGAINST:
 -

Audio/Video

- Example of audio/video content that can be useful to the university users (students/professors).
 - Lecture/lab notes
- When does it make sense to place a video (for example of a class) on YouTube or a similar site?
 - The idea is not necessary wrong, because for example users on the Internet won't consume bandwidth on the university link to access such videos.
 - However, you should have a local copy too, so that students from within the university do not need to consume bandwidth on the Internet link.

A bit of math

- Let's suppose our university was using a 1Mb ADSL link to get to the Internet.
 - What would happen if 20 users listened to an online/internet radio while working in a lab?
 - What would happen if 20 users watched videos on YouTube while working in a lab?
 - ...

Monitoring

- Why does it mean “*monitoring the network*”?
- Why is it important to monitor the network?
- How can we monitor the network?

Monitoring

- iptraf (<http://iptraf.seul.org/>)
- NTOP (<http://www.ntop.org>)

- MRTG (<http://oss.oetiker.ch/mrtg/>)
- NAGIOS (<http://www.nagios.org>)
- CACTI (<http://www.cacti.net>)
- Wireshark (<http://www.wireshark.org>)
 - tcpdump
- ...

Already
familiar
with it

Expert
with it

NOTE:
we could not cover
these ones because of
lack of time

Quick intro/review of basic Linux/Fedora concepts

- Basic packages managements (*rpm, yum*)
- Starting/stopping a service
 - *service <service_name> status|start|stop*
- Crontab
- Logfiles
- Configuration files (*/etc*)
- RRDtool (Round Robin Database tool)
- Net utils (*ping, traceroute, ...*)
- Mysql
- SNMP ...

Basic packages management (1/3)

rpm

- Install a package (without taking care of dependencies)
 - *rpm -i <package_name>*
- Check whether a package is installed
 - *rpm -qi <package_name>*
- Get the list of files in a given package
 - *rpm -ql <package_name>*
- Get the package a given file belongs to.
 - *rpm -qf <file_name>*
- ...

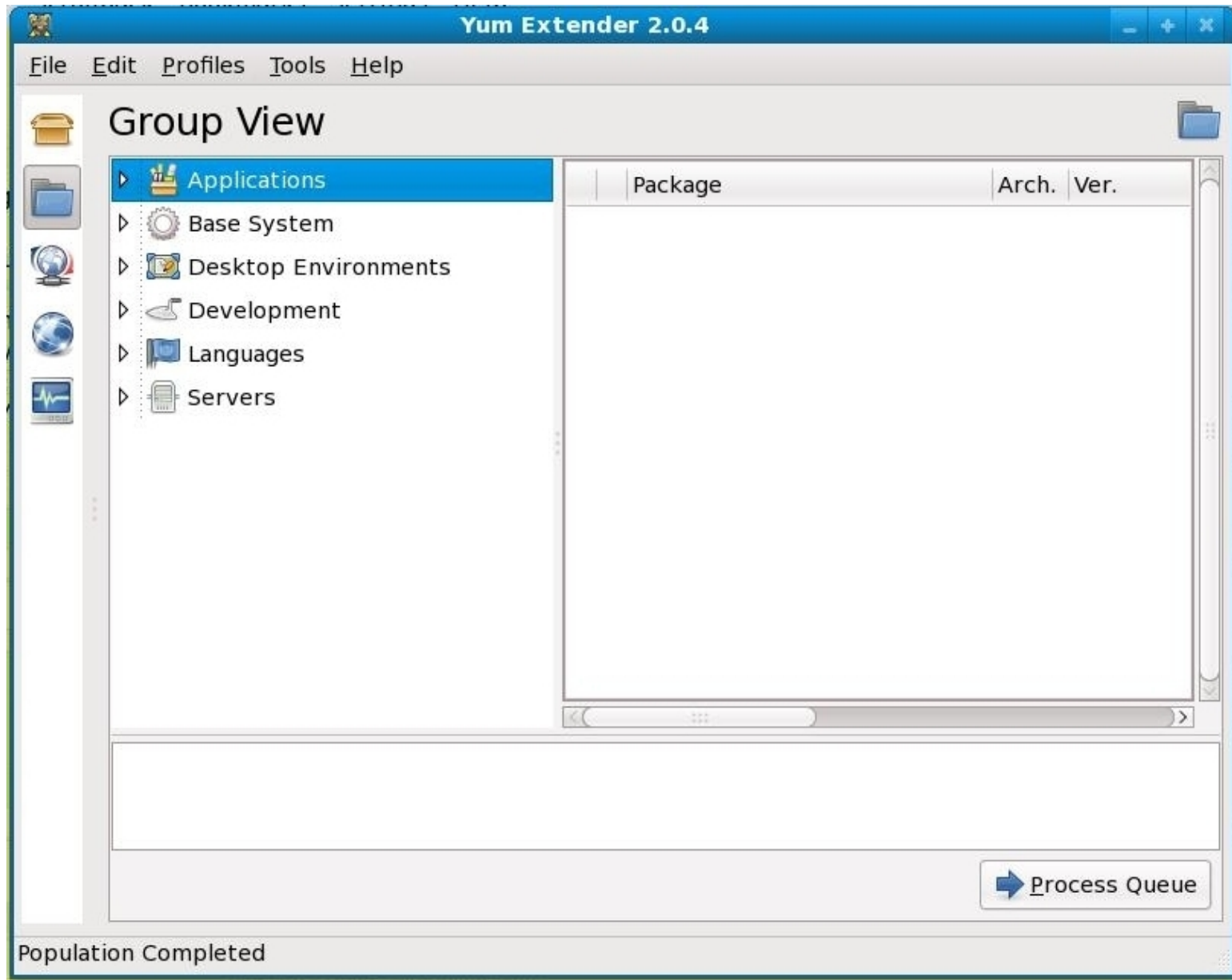
Basic packages management (2/3)

yum

- Install a package (taking care of dependencies)
 - *yum **install** <package_name>*
- Check dependencies for a package
 - *yum **deplist** <package_name>*
 - (ex *yum deplist cacti*)
- Search for packages matching a given string
 - *yum **search** <string>*
- ...

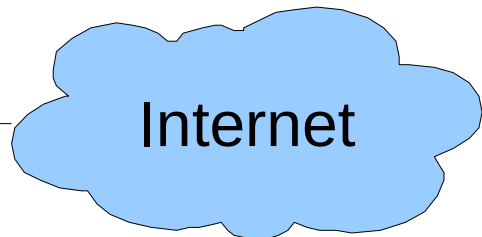
Basic packages management (3/3)

YumEx (Yum Extender)

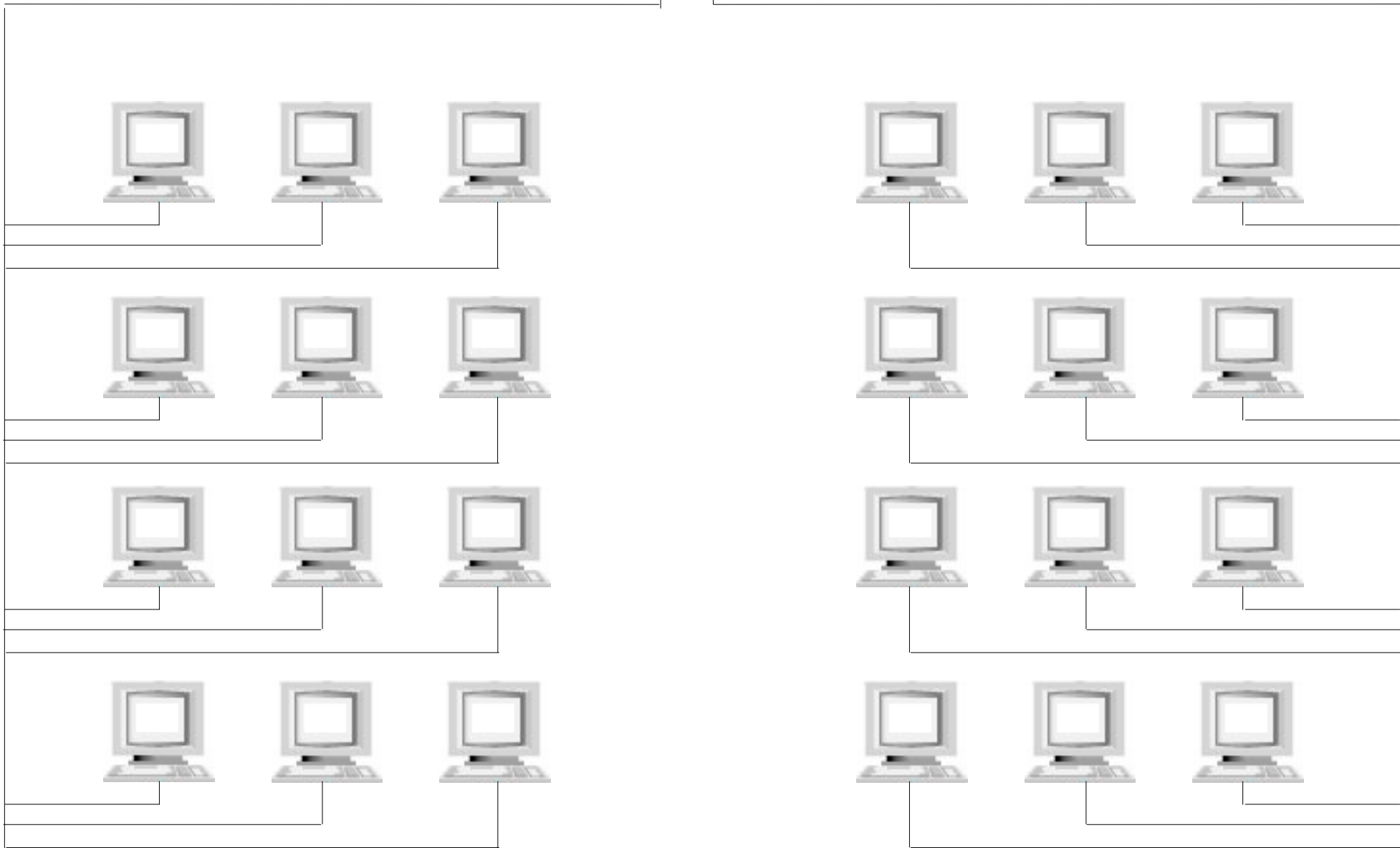


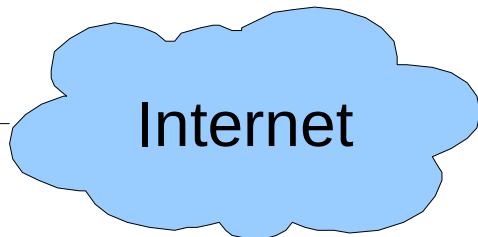
```
yum install yumex
```

Lab Setup



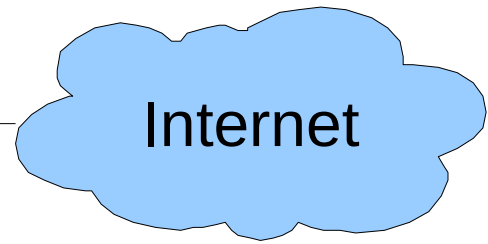
Internet





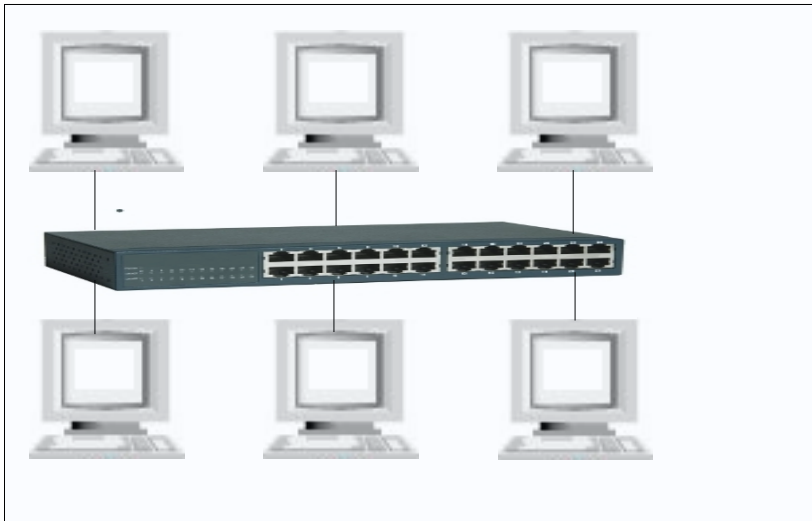
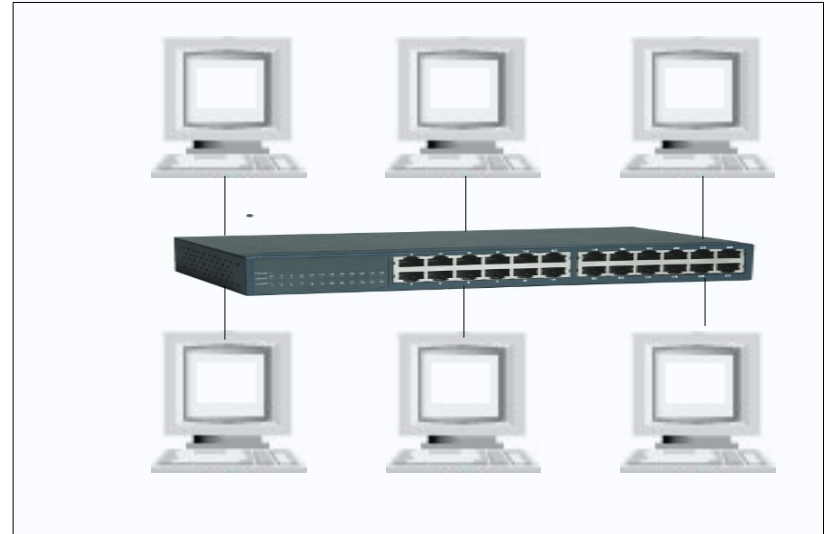
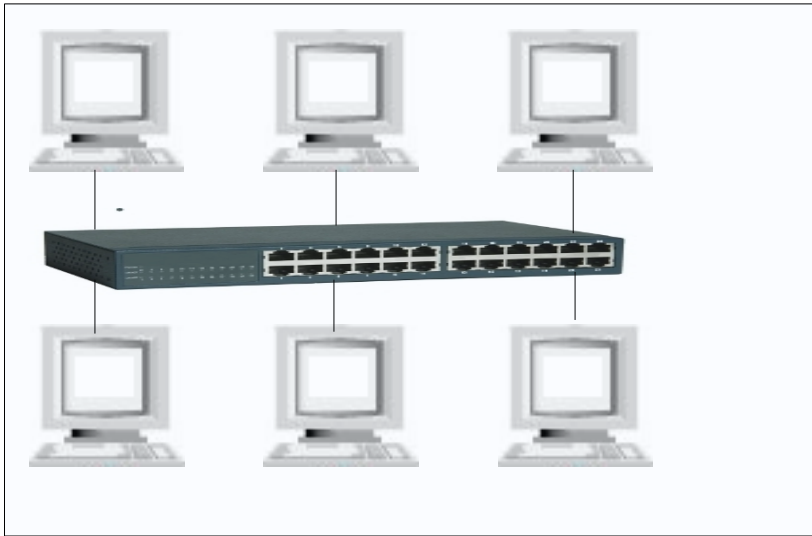
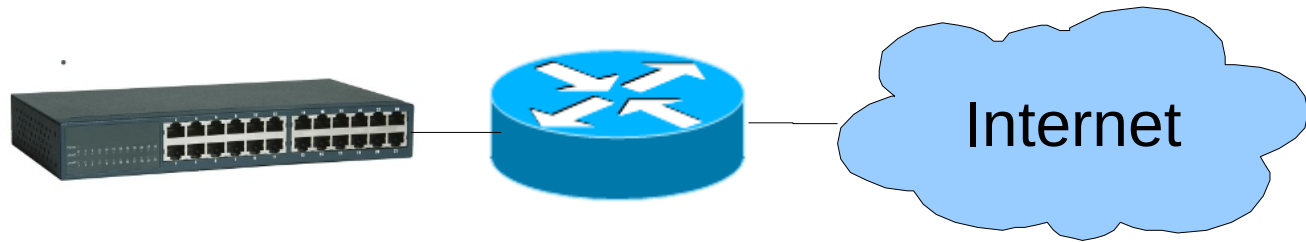
Internet

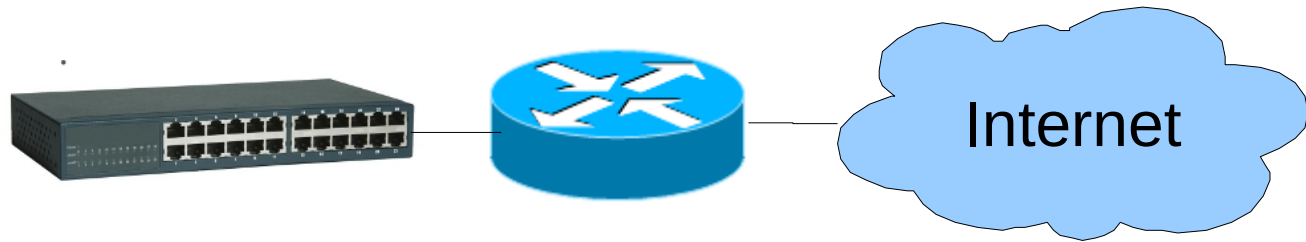




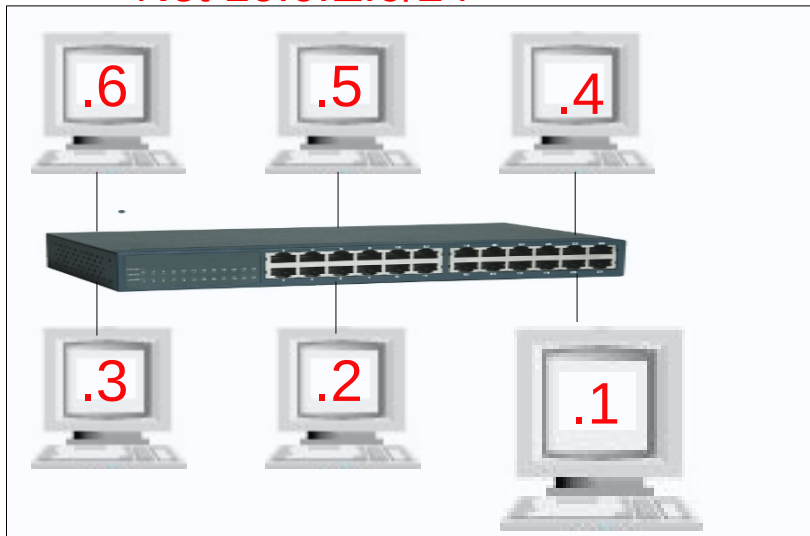
Internet



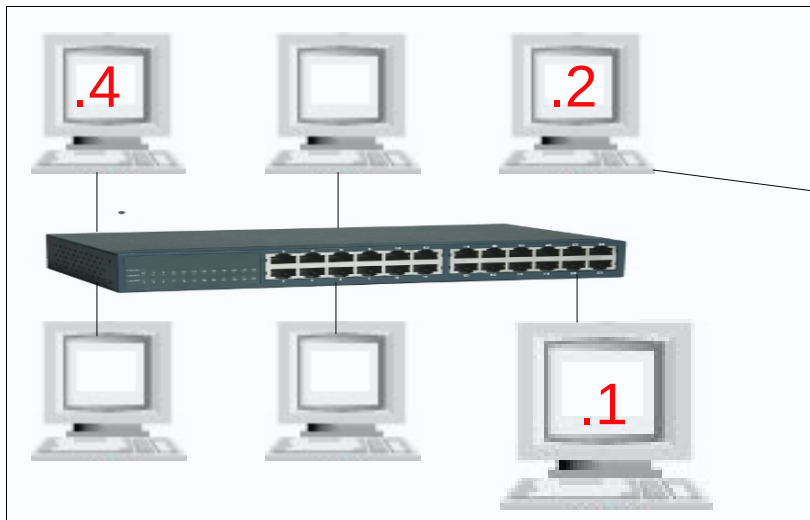
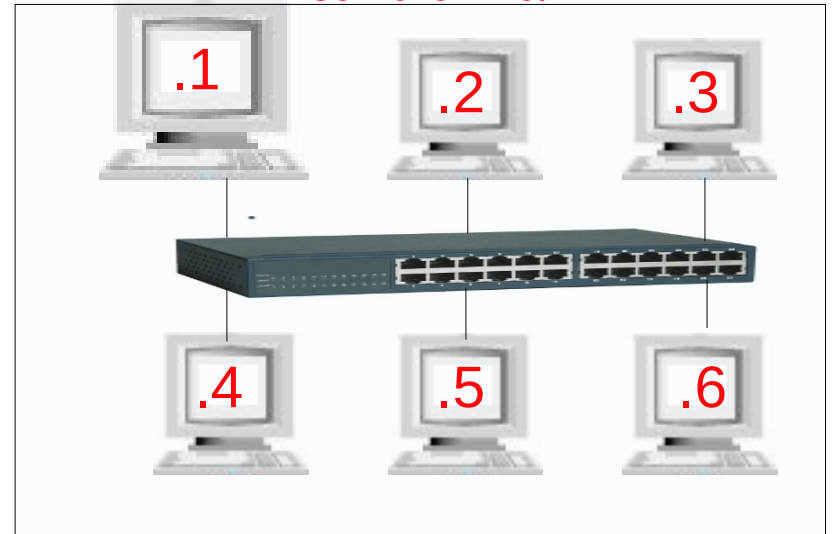




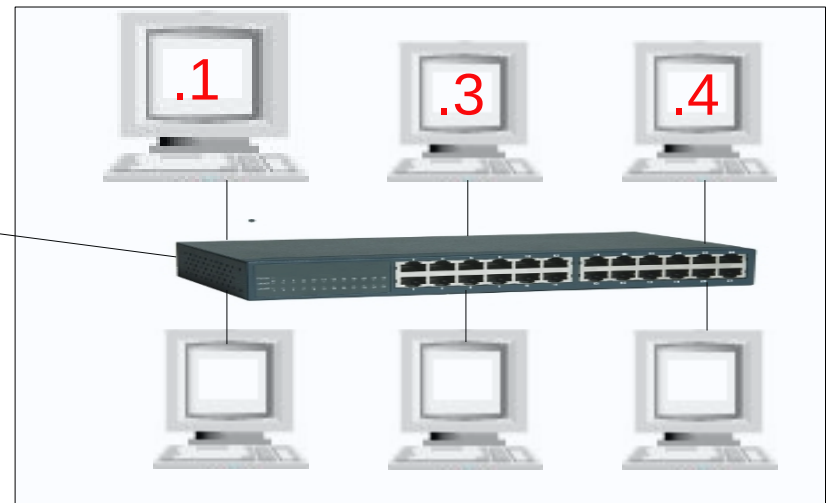
Net 10.0.1.0/24



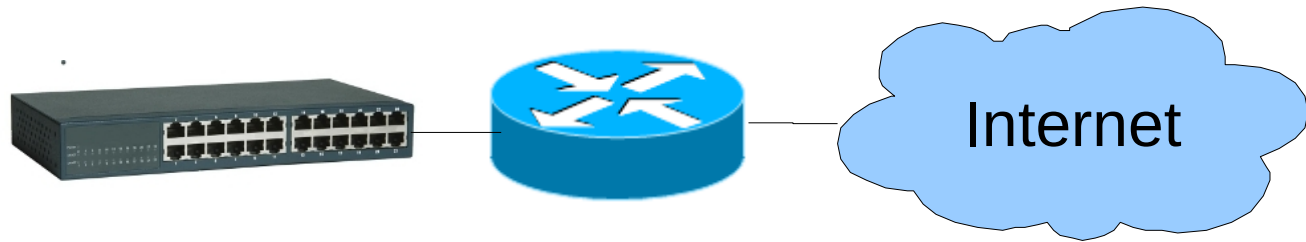
Net 10.0.2.0/24



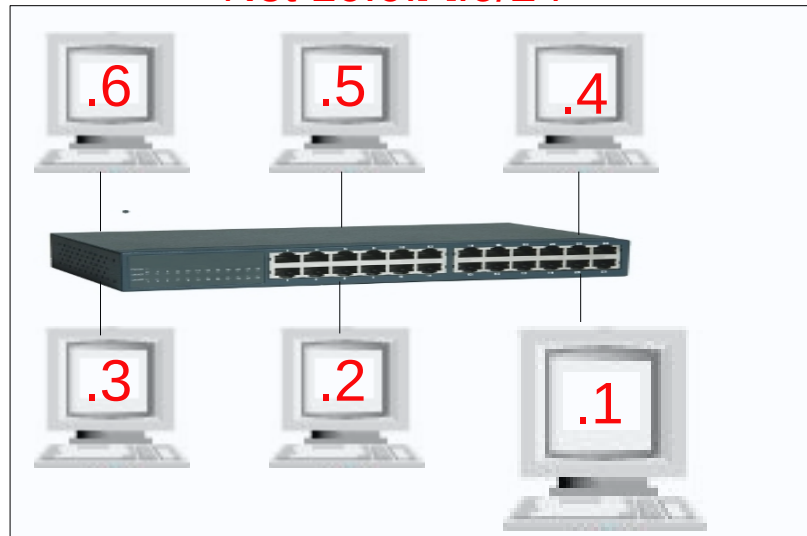
Net 10.0.3.0/24



Net 10.0.4.0/24



Net 10.0.X.0/24



```
ifconfig eth0 10.0.X.Y netmask 255.255.255.0
```

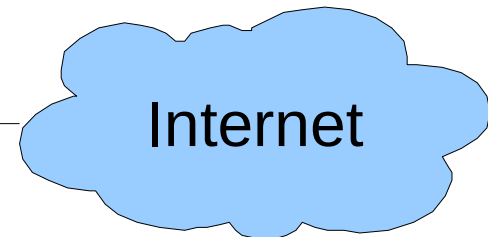
OR

```
ip addr add dev eth0 10.0.X.Y
```

Y = [1,2,3,4,5,6]

Exercise:

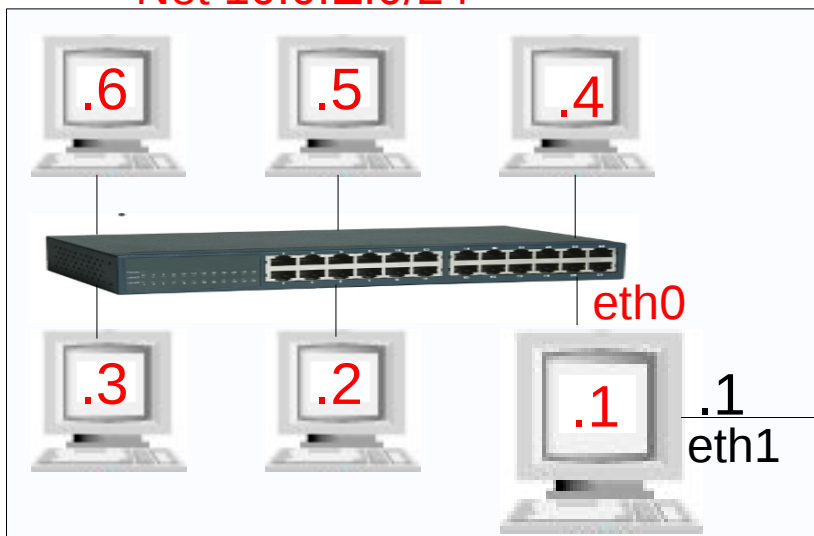
- Verify that all hosts within a group can see each other (with ping)



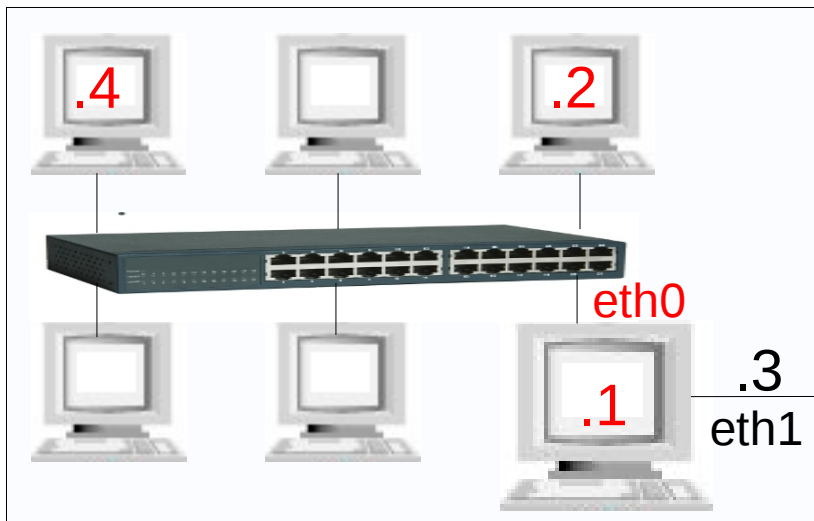
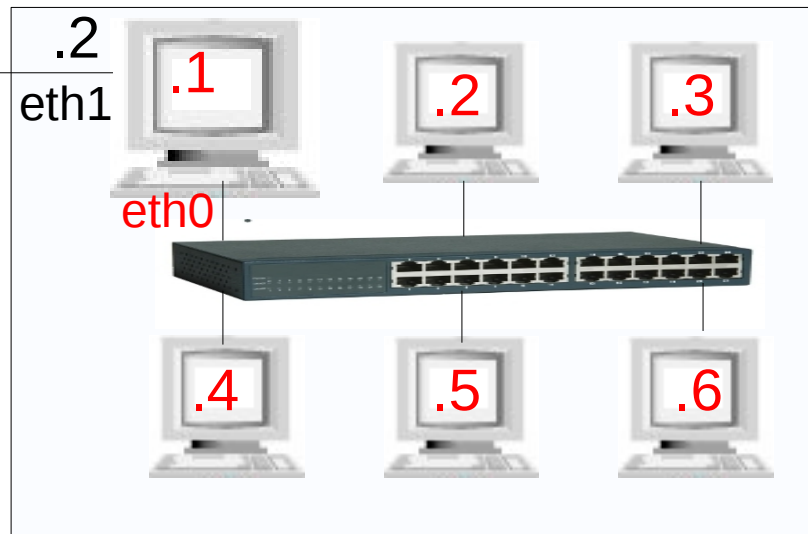
Net 10.0.5.0/24



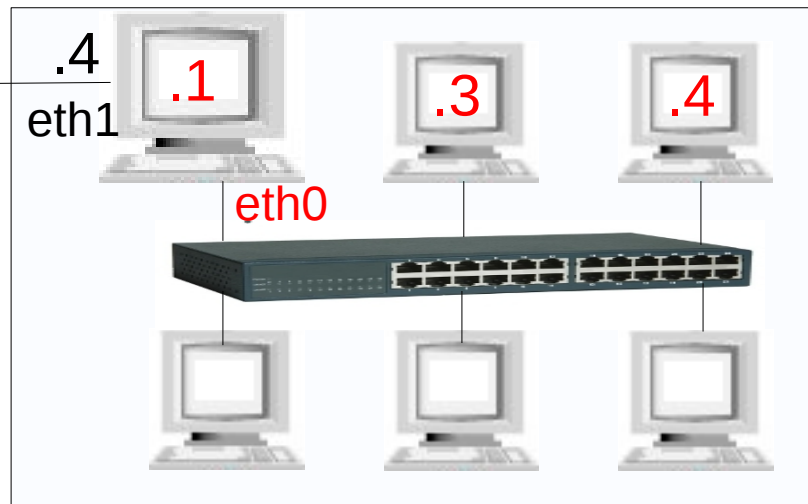
Net 10.0.1.0/24



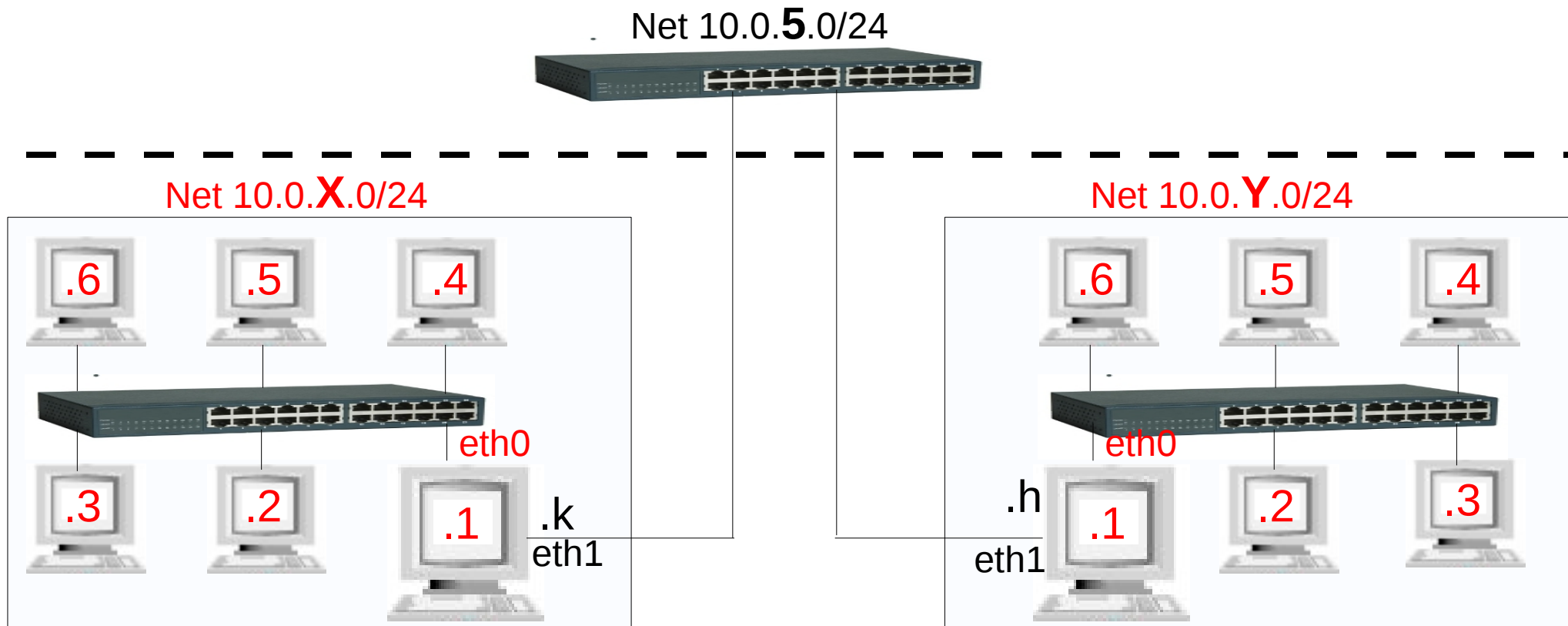
Net 10.0.2.0/24



Net 10.0.3.0/24



Net 10.0.4.0/24



On the router only:

```
ifconfig eth1 10.0.X.K netmask 255.255.255.0
(OR: ip addr add dev eth0 10.0.X.K)
```

```
+
```

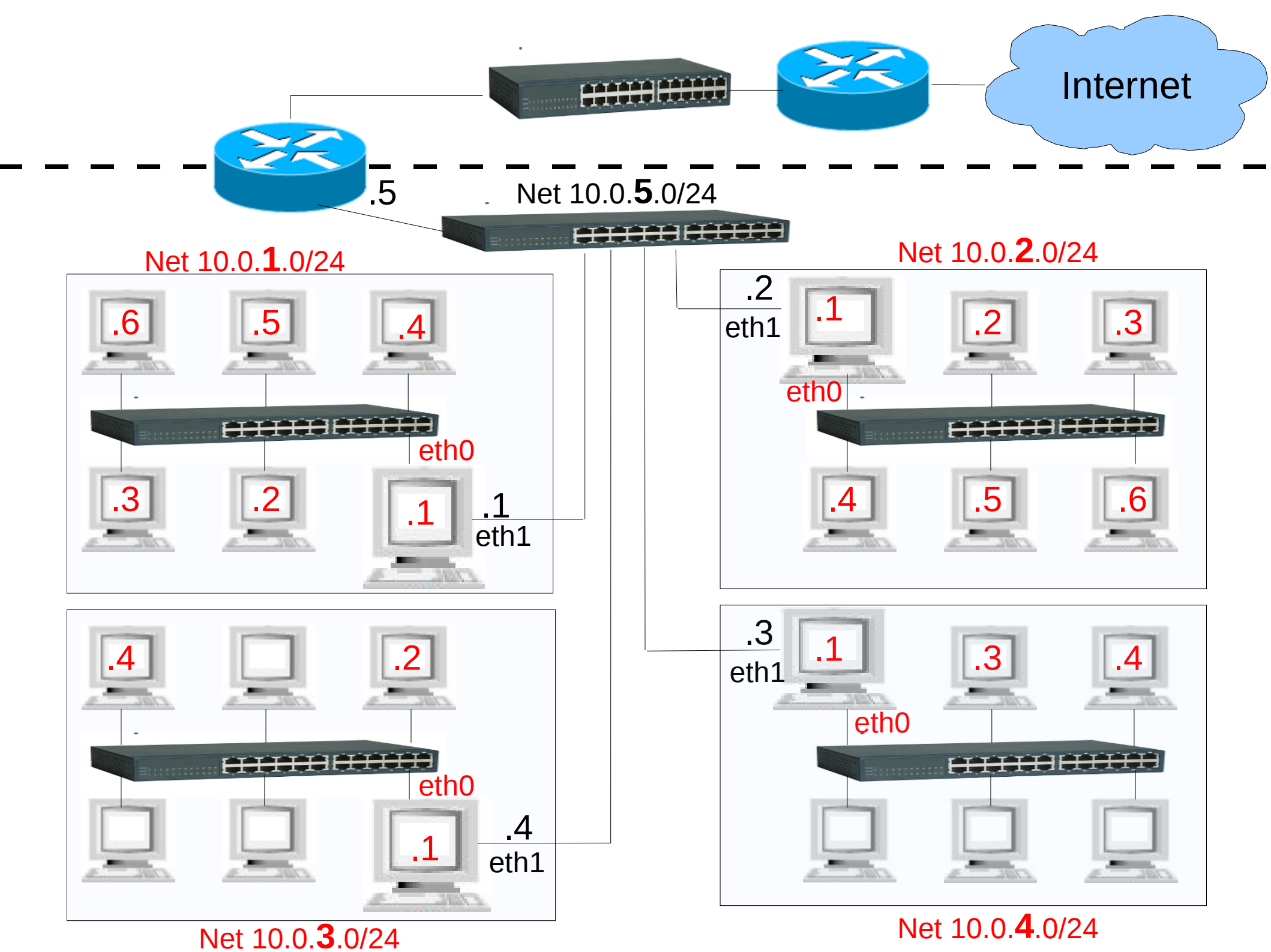
```
route add -net 10.0.Y.0 netmask 255.255.255.0 gw 10.0.5.h
(OR: ip route add 10.0.Y.0/32 via 10.0.5.h)
```

On the hosts only:

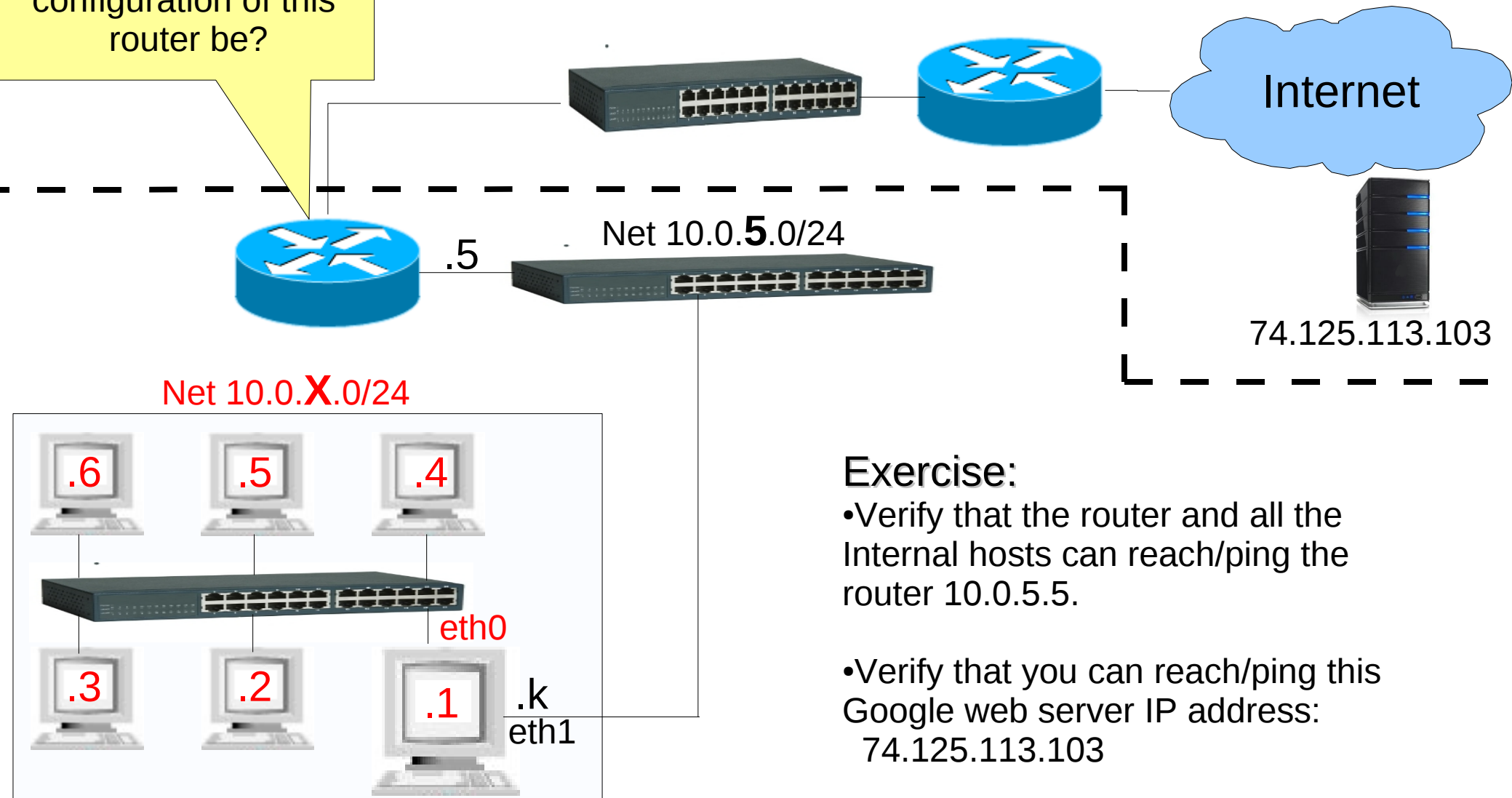
```
route add default gw 10.0.X.1
(OR: ip route add 0.0.0.0 via 10.0.X.1)
```

Exercise:

- Verify that all routers can reach/ping both IP addresses of all other routers:
10.0.Y.1
10.0.5.h
- Verify that the internal hosts can reach/ping the hosts in the other networks:
10.0.Y.Z con Z=[1,2,3,4,5,6]



What would the configuration of this router be?



Exercise:

- Verify that the router and all the Internal hosts can reach/ping the router 10.0.5.5.
- Verify that you can reach/ping this Google web server IP address: 74.125.113.103
- Verify that you can reach/ping the Yahoo web server <http://www.yahoo.com> and browse the internet with Firefox.

On the router only:

```
route add default gw 10.0.5.1  
(OR: ip route add 0.0.0.0 via 10.0.5.5)
```

Back to monitoring ...

Monitoring - iptraf

- Simple and basic text-based monitoring tool
- It only shows the current state (no statistics/history)



The screenshot shows the IPtraf application window. The title bar is blue and contains the text "IPtraf". The main area is grey. A blue menu box is centered, containing the following text:

```
IP traffic monitor
General interface statistics
Detailed interface statistics
Statistical breakdowns...
LAN station monitor

Filters...

Configure...

Exit
```

At the bottom of the window, there is a cyan bar with the text "Displays current IP traffic information" and a blue bar with the text "Up/Down-Move selector Enter-execute".

Monitoring - Network Top (**NTOP**) (1/2)

- Mainly used to monitor the interfaces on the local host
- It can also monitor remote interfaces through the Netflow/sFlow protocols
- Powerful traffic classification
- Web interface
 - Embedded http/https server (ie, no need for Apache)
- Graphs based on RRDtool

Monitoring - Network TOP (NTOPI) (2/2)

- **Exercise 1**

- Check if it is already installed
 - *rpm -qi ntop*
- Install it if necessary
 - *yum install ntop*
- Identify the configuration file/s AND the init file
 - *rpm -ql ntop | grep etc*
- Start it

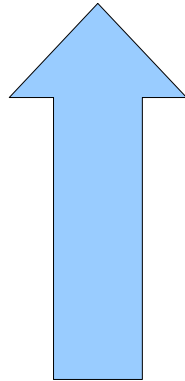
- **Exercise 2**

- Add all local devices to the configuration

- **Exercise 3**

- Connect with the browser to a remote *ntop* instance

Quick intro to
Qos or Firewalling?



Documentation

- Iptables/Netfilter: <http://www.netfilter.org>
- Linux Advanced Routing & Traffic Control:
<http://www.lartc.org>
- How to accelerate your Internet (en ingles).
<http://bwmo.net>. It is free.