

## Homework 1

Due date: Tuesday Jan 15, 2008

### Assignment 1

Figure out the IP address used by your Internet connection at school and retrieve information about the corresponding network prefix and AS from the IRRs. In particular, check the AS import/export policies and gather information about the peering ASs. Do the same with your home Internet connection. If you don't have one, look for a public place with Internet access. Write a short report with your findings.

*Note: if the PC, laptop or PDA you are using has been assigned a private IP address, you are behind a NAT device. Private addresses are those included into prefixes 10.0.0.0/8, 172.16.0.0/12, 192.168.0.0/16. In order to retrieve the public address used by the NAT, check one of the following websites: <http://www.whatsmyip.org> or <http://www.ip-adress.com>.*

### Assignment 2

From your school or home Internet access execute a traceroute command to each of the following web servers:

1. [www.google.com](http://www.google.com)
2. [www.suny.edu](http://www.suny.edu)
3. [www.unibo.it](http://www.unibo.it)
4. [www.bupt.edu.cn](http://www.bupt.edu.cn)
5. [www.usyd.edu.au](http://www.usyd.edu.au)
6. [www.afrinic.net](http://www.afrinic.net)
7. [www.unicamp.br](http://www.unicamp.br)

Gather as much information as possible about networks and ASs traversed from the traces obtained. Write a short report with your findings.

*Note: in case the traceroute requests start timing out at some point, you have probably reached a firewall blocking them. However, you should already be on or very close to the destination network.*

### Problem 3

With reference to the time diagrams on slide 30, define the following parameters for a switching network:

$N$  number of hops between two given end systems

$L$  message length in bytes

$B$  data rate in Mbps (same value for all links)

$P$  fixed packet size, including header, in bytes

$H$  header size per packet, in bytes

$t_d$  propagation delay in milliseconds between two nodes (same value for all links)

$t_p$  processing delay in milliseconds at each node (both intermediate and end system)

1. Derive general expressions for the end-to-end delay required by the message to reach the destination (i.e. do not consider the acknowledgment) in case of circuit switching, virtual circuit packet switching and datagram packet switching. Assume that signals and packets involved in the call setup phase carry the same amount of information as a packet header.
2. Resolve the three expressions assuming  $N = 4$ ,  $L = 10000$ ,  $B = 2$  Mbps,  $P = 1500$ ,  $H = 20$ ,  $t_d = 5$  ms and the processing time  $t_p$  negligible.
3. Compare the results obtained for circuit and datagram switching and find the conditions under which datagram switching gives a smaller latency than circuit switching.