

# Fundamentos de Redes

## Mini-Projeto

Professors:

Susana Sargento	<a href="mailto:susana@ua.pt">susana@ua.pt</a>
Paulo Salvador	<a href="mailto:salvador@ua.pt">salvador@ua.pt</a>
Miguel Luís	<a href="mailto:nmal@av.it.pt">nmal@av.it.pt</a>

**Objective 1:** Definition of the IPv4 and IPv6 addressing scheme of a business network. Configure the company communication network.

Note that  $x_0x_1x_2x_3x_4$  and  $x_5x_6x_7x_8x_9$  are the digits of your UA numbers.

**Deadline:** 8<sup>th</sup> November

### Description:

Consider the communication network of a company depicted in the following figure:

- (a) it contains the IPv4 public class C addresses  $200.1x_3x_4.1x_8x_9.0/24$ ;
- (b) it contains the IPv6 global address  $2001:x_2x_7::/60$ ;
- (c) it internally uses the range of IPv4 private class C address  $10.1x_4x_9.0.0/16$  (several class C networks);
- (d) every local network has a private IPv4 and an IPv6 global network;
- (e) considering the public IPv4 addressing, there are several equipments in the network that need public addressing: 55 servers at the DMZ, 45 servers at the Internal Datacenter, 5 PCs in the Design VLAN, 9 PCs in the Admin VLAN, 48 PCs in the Marketing VLAN, Router1 needs 11 IPv4 public addresses to configure NAT/PAT mechanisms.
- (f) An already existent network (Old Building) has the IPv4 network  $192.168.0.0/23$  and the terminals must maintain their IPv4 addresses. IPv6 connectivity is not required in the Old Building.

Define the private and public IPv4 sub-networks, and the global IPv6 networks with its network address and mask. Define also the range of IP addresses of the terminals and servers.

**Objective 2:** Build, test and run the network in GNS3.

**Deadline:** 3<sup>rd</sup> January

The Internet is simulated with the IPv4 network  $100.0.0.0/24$  and the IPv6 network  $3000::A::/64$ .

1. Configure, in Layer 2 and Layer 3 switches, the different VLANs and the access and inter-switch/trunk ports.
2. Configure the IPv4 and IPv6 addressing in the different equipments.
3. Include and configure (at least) 1 terminal in each VLAN with the corresponding IP addresses and gateway(s).
4. In Router 1, configure the NAT/PAT mechanisms in an appropriate way. Use the range of public IPv4 addresses to configure the translation with the private network.
5. DHCP server must be configured in Router A to assign private addresses to the Old Building equipments.
6. Configure the IPv4 and IPv6 internal routing using an internal routing protocol.
7. Router 1 should announce a default route, both in IPv4 and IPv6.
8. Place a terminal in the “Internet” to test IPv4 and IPv6 connectivity.
9. Develop e client-server application (in python using sockets) that allows a client to periodically notify a

central server of its CPU utilization and percentage of memory in use. [This task does not have to be integrated in GNS3, but a demonstration of the application in use must be possible.]

### Extra Tasks

Configure an IPv4 DHCP server in a single VLAN (you may choose it).

Configure a HTTP/HTTPS server.

Configure a DNS server.

