

# Redes de Telecomunicações, 2021/2022

## Projeto

Professors:

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**Num. Mec. Group member 1:** 0/1X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>X<sub>4</sub>X<sub>5</sub>; **Num. Mec. Group member 2:** 0/1X<sub>6</sub>X<sub>7</sub>X<sub>8</sub>X<sub>9</sub>X<sub>10</sub>;

**Objective 1:** Definition of the IPv4 and IPv6 addressing scheme of a business network. Configure the company communication network. Addressing report to be submitted in e-learning. Deadline: 18 May 2022.

### Description:

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

- (a) it contains the IPv4 public class C address 194.1X<sub>8</sub>X<sub>9</sub>.0X<sub>3</sub>X<sub>4</sub>.0/24;
- (b) it contains the IPv6 global address 2200:AX<sub>8</sub>X<sub>9</sub>X<sub>10</sub>:AX<sub>2</sub>X<sub>3</sub>X<sub>4</sub>::/60;
- (c) it internally uses the range of IPv4 private class B address 172.16.0.0/16 (several class C networks);
- (d) every local network has a private IPv4 and an IPv6 network;
- (e) considering the public IPv4 addressing, there are several equipments in the network that need public addressing: 55 servers at the Design network, 28 servers at the Marketing network, 35 servers in the Administration network, 30 servers in the Internal Datacenter, and Router1 needs 11 IPv4 public addresses to configure NAT/PAT mechanisms;
- (f) an already existent network (Old Building) has the IPv4 network 192.168.1.0/24 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, servers and interfaces that need IP address.

**Objective 2:** Build, test and run the network in GNS3. Deadline: 18 June 2022.

### Description:

Consider the communication network of the company defined before.

The Internet is simulated with the IPv4 network 111.2.3.0/24 and the IPv6 network 2111:B:C:D::/64.

1. Configure in the switches Layer 2 and Layer 3 the respective VLANs and the access and inter-switch/trunk ports.
2. Configure the IPv4 and IPv6 addressing in the equipments.
3. Include and configure 2 terminals in each VLAN with the IP addresses and gateways.
4. Configure in Router1 the NAT/PAT mechanisms in an appropriate way. Use the range of public IPv4 addresses to configure the translation with the private network.
5. Configure the internal routing IPv4 and IPv6 in the network with the RIPv2 and RIPv6 protocols.
6. The old building should be interconnected with the remaining network using RIPv2.
7. DHCP server must be configured in Router2 to assign private addresses to the Old Building equipments.
8. Configure in Router1 default static IPv4 and IPv6 routes for the Internet through the ISP.
9. Configure in ISP IPv4 and IPv6 routes for the company network through R1.
10. Include and configure a terminal in the “Internet” and test the connectivity with the terminals in the company.
11. Develop a client-server application (using sockets) that allows a client to contact the server to get information about the server (hostname, IP address). Additionally, the server also includes in the response the number of times it received requests from each client (via comparing the IP of the request).

### Extras:

1. Configure a HTTP/HTTPS server.
2. Configure a DNS server.

