Fundamentos de Redes
Mini-Projeto

Professors:
Paulo Salvador salvador@ua.pt
Pedro Rito pedrorito@ua.pt

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: 15th November (Report uploaded via moodle/elearning.ua.pt)

Description:
Consider the communication network of a company depicted in the following figure:
(a) has 4 user VLAN (Engineering, Administration, Marketing and Video Conference), that must all be supported in all Layer 2 switches;
(b) has available the IPv4 public network 200.1x_3x_4.1x_8x_9.0/25;
(c) has available the IPv6 global network 2100:0:0:$x_2x_7$00::/60;
(d) internally uses the range of IPv4 private address 10.1x_4x_9.0.0/16;
(e) every local network has a private IPv4 and an IPv6 global network;
(f) considering the public IPv4 addressing, there are several equipments in the network that need public addressing: 32 servers at the DMZ, 10 servers at the Internal Datacenter, 5 PCs in the Engineering VLAN, 2 PCs in the Admin VLAN, 7 devices in the Video Conference VLAN, Router1 needs 5 IPv4 public addresses to configure NAT/PAT mechanisms.
(g) An already existent network (Old Building) has the IPv4 network 192.168.2.0/23 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 all IP addresses of all Layer 3 switches and routers interfaces.

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

Deadline: 19th January (Configuration files uploaded via moodle/elearning.ua.pt)

The Internet is simulated with the IPv4 network 100.0.0.0/24 and the IPv6 network 3000:A:A: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) all terminals depicted in the network diagram 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 IPv4 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 multiple clients to periodically notify a central server of their 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 a HTTP/HTTPS server.
Configure a DNS server.