

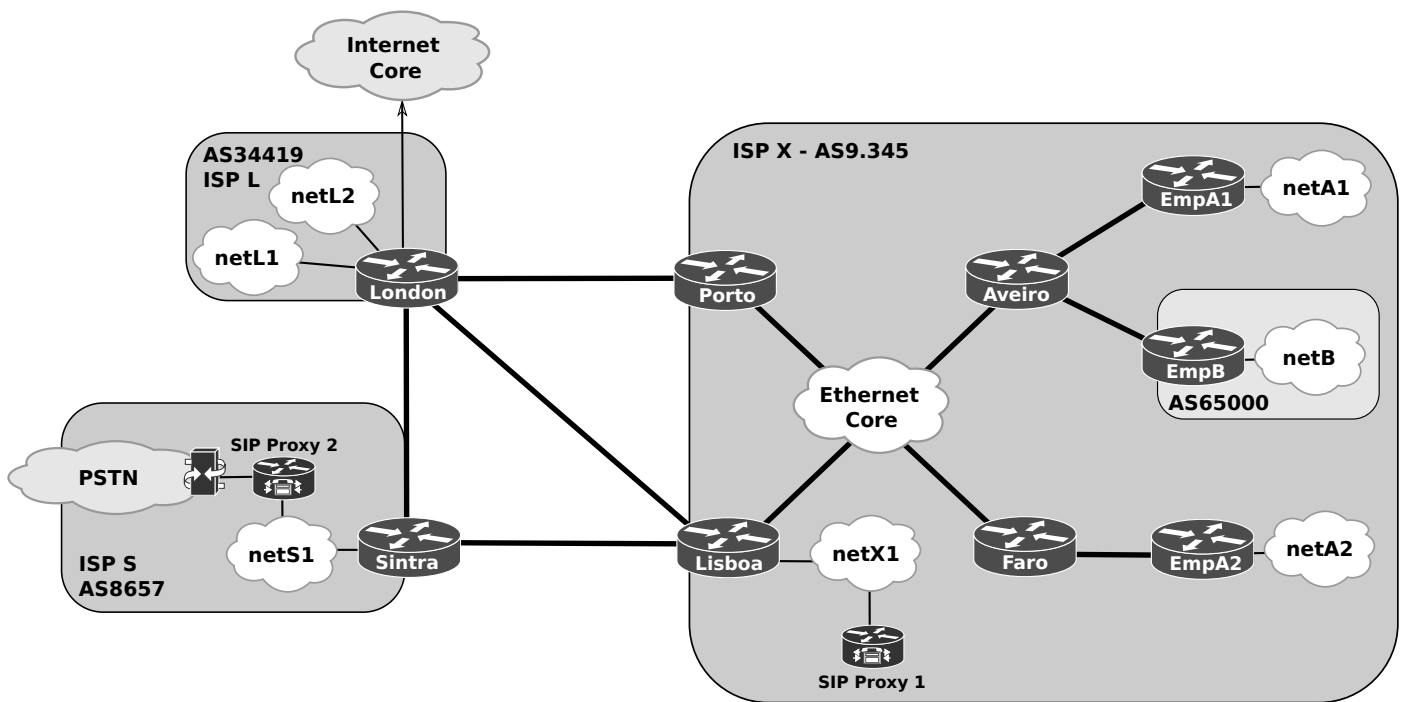
# Arquitetura de Redes Avançadas

## 2015 Project

Professor:

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- A detailed report, with all engineering options, relevant configurations and deployment tests, must be submitted until the deadline in PDF format via [elearning.ua.pt](http://elearning.ua.pt).
  - All engineering choices must have a valid justification.
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### Scenario description:

- Assume that you are the engineer responsible for the network of ISP X with AS 9.345 (depicted above).
- AS9.345 has two peering relations: (i) with ISP L (AS34419) via Porto and Lisboa, and (ii) with ISP S (AS8657) via Lisboa. ISP X is a non-transit AS.
- ISP X has two corporate clients (A and B), to which provides IP interconnectivity and a VoIP service with PSTN interconnectivity.
- Corporate client A has two branches, one in Aveiro and another in Faro, connection is provided using Router EmpA1 and Router EmpA2, respectively.
- Corporate client B, has a single location in Aveiro, however corporate client B is a private BGP autonomous system.
- ISP S provides PSTN interconnection through SIP Proxy 2.
- ISP L provides interconnection to Internet Core.

- ISPs and Corporate clients have the following IPv4 and IPv6 IP networks:

ISP X - core and point-to-point links	192.172.100.0/25 10.1.0.0/16	2001:192:100::/48
ISP X - netX1	192.172.100.128/25	2001:192:101::/48
Corporate client A	80.172.100.128/25 10.1.0.0/16 (see note)	2001:80:100::/48
Corporate client B	81.84.100.0/24	2001:81:100:/48
ISP L - netL1	82.84.100.0/24	2001:82:100::/48
ISP L - netL2	82.84.200.0/24	2001:82:200::/48
ISP S - netS1	200.1.100.0/24	2001:200:100::/48
BGP peering links	4.20.20.0/26	2001:420::/60

## Deployment requirements:

### Basic mechanisms and BGP (10 points)

- Provide full IPv4 and IPv6 between ISP X clients and Internet Core, according to scenario constraints (above) and ISP networking good practices.
- Implement the following routing constraints:
  - ◆ IP traffic towards Internet should be preferably routed via ISP S (Lisboa).
  - ◆ IP traffic towards netL1 and netL2, should be preferably routed via Porto from Aveiro, and via Lisboa from Faro.
  - ◆ IP traffic for remote SIP proxy 2 (to network netS1) should be routed only via Lisboa using the direct peering link to ISP S.

### MPLS (7 points)

- Deploy (within ISP X) MPLS tunnels for SIP traffic (where relevant) with a 1Mbps reservation each.
- Deploy a MPLS VPN (IPv4 routes only) for Corporate client A, interconnecting Aveiro and Faro branches.

### VoIP - SIP (3 points)

- Deploy a VoIP - SIP service for all ISP X corporate clients. The service provides VoIP connectivity (through ISP proxy 1) between internal clients and forwards all other calls (including PSTN numbers) to ISP S SIP proxy. The assigned (PSTN compatible) telephone numbers are: for Corporate client A 2341000xx and 2891001xx, and for Corporate client B 2341002xx. Note: Only SIP proxy 1 configurations/behavior will be evaluated.

### Extra:

- Deploy a CDN routing service (Conditional DNS) for corporate clients. (1 point)
- Deploy a security service to Corporate client B (Firewall between router Aveiro and router EmpB). (1 point)
- Any other relevant ISP service...

### Deployment and Demonstration notes:

- During demonstration, if necessary due to lack of computational resources, some routers may be turned off (where/when irrelevant to mechanisms being shown).
- NAT/PAT is not required. Corporate clients IPv4 private networks are only to be used with MPLS VPN.
- You may assume that the IP subnet of all VoIP VLANs in corporate clients' networks is known by ISP X. Also, netX1 only contains VoIP related services.
- To test SIP deployment just make SIP proxy 2 “answer” all calls forwarded towards him as a simple client.