Communication Architectures
Project (Época Recurso)

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Objective: Perform the technical design, configure and test a doble datacenter network with multiple enterprise clients.

Description:
- The company DC4ALL LLC is a Datacenter operator with proprietary long range communication infrastructure. Their Datcenters allow the seamless interconnection of virtual and bare-metal servers.
- The company has two Datacenters at different geographic locations (Porto and Lisbon).
- The company has large clients with distributed server clusters that require specific connectivity.
- The different Datacenters are interconnected by a proprietary network and devices that support MPLS and DiffServ (depicted below).
- The company is an Internet Autonomous System with number 22900, with peering BGP relations with other AS at the Core Routers, that provide interconnection with the Internet core (out of the scope of his project).
- The company has the IPv4 network 10.0.0.0/22 for use in the interconnection infrastructure.
- The company has two large clients (L1 and L2):
  - Client L1 has one server cluster subdivided in three Ethernet VLANs (VLAN 10: 10.10.0.0/22, VLAN 20: 10.20.0.0/22, VLAN 30: 10.30.0.0/22).
  - Client L2 has no VLANs, only a LAN (10.40.0.0/22).
- None of the clients require Internet connection.
- All clients have servers in all locations and racks.
- Client L1, requested an Ethernet private network between its server locations. All private Ethernet traffic should have (at the network core) a guaranteed bandwidth of 10Mbps. The connection should have high resilience to link failures.
- Client L2, requested an Ethernet private network between its server locations. All private Ethernet traffic should should be differentiated (at the network core) with a predefined Assured Forwarding policy (guaranteed up to 10 Mbps).
- The company provides a service to monitor the core network and datacenters for each client. Based on SNMP and/or SSH: monitor the used bandwidth between the datacenters over time (per virtual connection) and localization of each server (MAC/IP per rack switch).

Note 1: Routers Lisbon, Porto, Core1 and Core2 must be Cisco C7200 devices.

Note 2: Datacenters' multi-layer switches (S* and L*) should be deployed with Linux containers with FRRouting.

Note 3: Server racks, can be emulated with a basic switch and VPCs or docker container busybox.

Note 4: Cisco Routers can not route traffic based on VXLAN VNIs, the traffic routing must be done based only on UDP ports and/or different source and destination IPv4 addresses.

Implementation points:
- Basic assembly and core connectivity - 3 points;
- Clients L1 and L2 EVPNs - 5 points;
- Client L1 private network bandwidth reserve and routing - 5 points;
- Client L2 Layer 2 traffic differentiation - 3 points;
- SNMP and/or SSH monitoring - 4 points.

Evaluation

- ✔ Working demonstration (in person) until January 26th. No slides required!
- ✔ Written report uploaded (PDF format) until January 26th.

Core 1

Lisbon

Core 2

Porto

S1

L11 L12 L13

Rack 11 Rack 12 Rack 13

Lisbon Datacenter

S2

L21 L22 L23

Rack 21 Rack 22 Rack 33

Porto Datacenter