TÉCNICO LISBOA

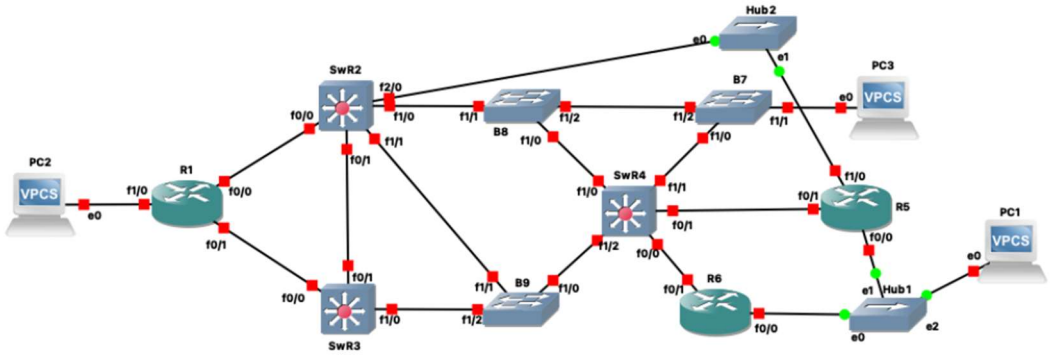
Network Architecture

LETI

2023/2024

Project Report

This project consists in the design, implementation, and test of a network with Layer 3 and Layer 2 routing protocols



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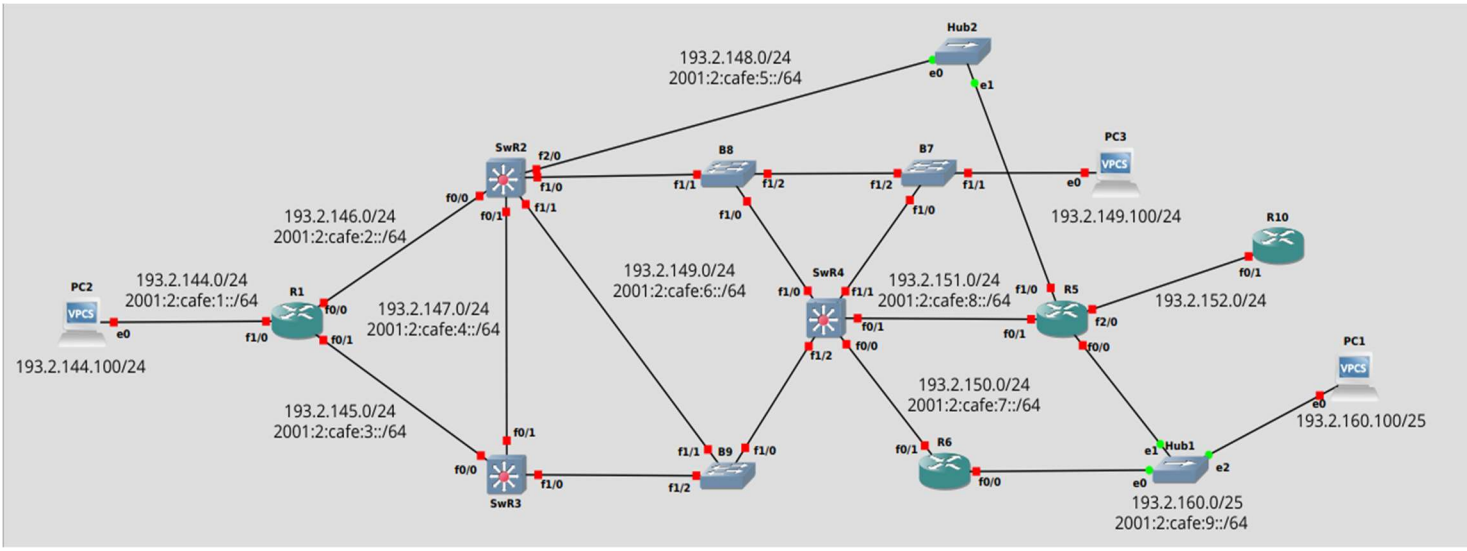


IPv4 Table

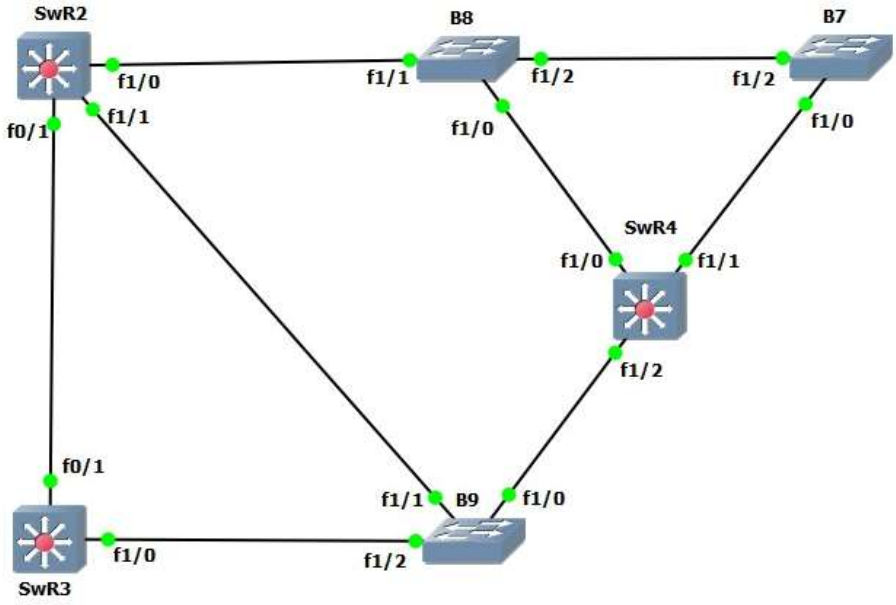
Device	Interface	IPv4 Address
PC1	Ethernet 0	193.2.160.100/25
PC2	Ethernet 0	193.2.144.100/24
PC3	Ethernet 0	193.2.149.100/24
R1	FastEthernet1/0	193.2.144.1/24
R1	FastEthernet0/1	193.2.145.1/24
R1	FastEthernet0/0	193.2.146.1/24
SwR2	FastEthernet0/0	193.2.146.2/24
SwR2	FastEthernet0/1	193.2.147.2/24
SwR2	FastEthernet2/0	193.2.148.2/24
SwR2	VLAN1	193.2.149.2/24
SwR3	FastEthernet0/0	193.2.145.3/24
SwR3	FastEthernet0/1	193.2.147.3/24
SwR3	VLAN1	193.2.149.3/24
SwR4	VLAN1	193.2.149.4/24
SwR4	FastEthernet0/0	193.2.150.4/24
SwR4	FastEthernet0/1	193.2.151.4/24
R5	FastEthernet1/0	193.2.148.5/24
R5	FastEthernet0/1	193.2.151.5/24
R5	FastEthernet0/0	193.2.160.5/25
R5	FastEthernet2/0	193.2.152.5/24

R6	FastEthernet0/1	193.2.150.6/24
B6	FastEthernet0/0	193.2.160.6/25
B7	VLAN1	193.2.149.7/24
B8	VLAN1	193.2.149.8/24
B9	VLAN1	193.2.149.9/24
R10	FastEthernet0/1	193.2.152.10/24

IPv6 Table

Device	Interface	IPv6 Address
R1	FastEthernet1/0	2001:2:cafe:1::1/64
R1	FastEthernet0/1	2001:2:cafe:3::1/64
R1	FastEthernet0/0	2001:2:cafe:2::1/64
SwR2	FastEthernet0/0	2001:2:cafe:2::2/64
SwR2	FastEthernet0/1	2001:2:cafe:4::2/64
SwR2	FastEthernet2/0	2001:2:cafe:5::2/64
SwR2	VLAN1	2001:2:cafe:6::2/64
SwR3	FastEthernet0/0	2001:2:cafe:3::3/64
SwR3	FastEthernet0/1	2001:2:cafe:4::3/64
SwR3	VLAN1	2001:2:cafe:6::3/64
SwR4	VLAN1	2001:2:cafe:6::4/64
SwR4	FastEthernet0/0	2001:2:cafe:7::4/64
SwR4	FastEthernet0/1	2001:2:cafe:8::4/64
R5	FastEthernet1/0	2001:2:cafe:5::5/64
R5	FastEthernet0/1	2001:2:cafe:8::5/64
R5	FastEthernet0/0	2001:2:cafe:9::5/64
R6	FastEthernet0/1	2001:2:cafe:7::6/64
B6	FastEthernet0/0	2001:2:cafe:9::6/64
B7	VLAN1	2001:2:cafe:6::7/64
B8	VLAN1	2001:2:cafe:6::8/64
B9	VLAN1	2001:2:cafe:6::9/64

Network L2



Device	Interface	Cost	Status
SwR2	FastEthernet1/0	10	forwarding
SwR2	FastEthernet1/1	19	forwarding
SwR3	FastEthernet1/0	19	forwarding
SwR4	FastEthernet1/0	19	forwarding
SwR4	FastEthernet1/1	19	blocked
SwR4	FastEthernet1/2	19	forwarding
B7	FastEthernet1/0	19	forwarding
B7	FastEthernet1/1	19	forwarding
B7	FastEthernet1/2	19	forwarding
B8	FastEthernet1/0	19	forwarding
B8	FastEthernet1/1	19	forwarding
B8	FastEthernet1/2	19	forwarding
B9	FastEthernet1/0	19	forwarding
B9	FastEthernet1/1	40	blocked
B9	FastEthernet1/2	19	forwarding

MACs SwR2:

Destination Address	Address	Type	VLAN Destination Port
c202.15eb.0000	Self	1	Vlan1
c206.16d5.0000	Dynamic	1	FastEthernet1/0
c203.1613.0000	Dynamic	1	FastEthernet1/0

MACs SwR3:

Destination Address	Address	Type	VLAN Destination Port
c203.1613.0000	Self	1	Vlan1
c206.16d5.0000	Dynamic	1	FastEthernet1/0
c202.15eb.0000	Dynamic	1	FastEthernet1/0

MACs SwR4:

Destination Address	Address	Type	VLAN Destination Port
c206.16d5.0000	Self	1	Vlan1
c202.15eb.0000	Dynamic	1	FastEthernet1/0
c203.1613.0000	Dynamic	1	FastEthernet1/2

MACs B7:

Destination Address	Address	Type	VLAN Destination Port
c205.166b.0000	Self	1	Vlan1
c206.16d5.0000	Dynamic	1	FastEthernet1/2
c202.15eb.0000	Dynamic	1	FastEthernet1/2
c203.1613.0000	Dynamic	1	FastEthernet1/2
c206.1bb0.f100	Dynamic	1	FastEthernet1/2
c206.1bb0.f101	Dynamic	1	FastEthernet1/0

MACs B8:

Destination Address	Address	Type	VLAN Destination Port
c204.1639.0000	Self	1	Vlan1
c206.16d5.0000	Dynamic	1	FastEthernet1/0
c202.15eb.0000	Dynamic	1	FastEthernet1/1
c203.1613.0000	Dynamic	1	FastEthernet1/0

MACs B9:

Destination Address	Address	Type	VLAN Destination Port
c207.16f4.0000	Self	1	Vlan1
c206.16d5.0000	Dynamic	1	FastEthernet1/0
c203.1613.0000	Dynamic	1	FastEthernet1/2
c202.15eb.0000	Dynamic	1	FastEthernet1/0

Configuration

The AR Project involved detailed configurations across various network elements to optimize routing and network efficiency:

R1 Configuration: Integrated IPv6 unicast routing with OSPF cost set to 10 on interface f0/0 and cost 1 in interfaces f0/1, and f1/0 . Each interface was assigned an IP and an IPv6 address.

SwR2 Configuration: Similar to R1, OSPF costs were set to 10 for its interfaces. VLAN interface was also configured with OSPF cost 1 and for the interface f0/0 cost 1, also.

SwR3 Configuration: OSPF costs set to 10 for interfaces, including the VLAN interface.

SwR4 Configuration: Configured like SwR2 and SwR3, with OSPF cost adjustments on interfaces and VLAN, interface f0/1, cost 1 and interface f1/0, VLAN interface with cost 100 and interface f0/0 with cost 1 and “no ip redirection”.

R5 Configuration: In addition to IPv6 unicast routing, OSPF cost adjustments, and a new interface f2/0 with OSPF cost 100, R5 was configured with RIP, version 2, for specific network ranges.

R6 Configuration: This router was configured similarly to R5 without the RIP configuration. OSPF cost to interface f0/1 and f0/0 of 1 and 5, respectively.

B7, B8, and B9 Configuration: These switches were configured with specific default gateways.

PC1, PC2, PC3 Configuration: Each PC was configured with specific IP addresses and default gateways (For PC1 and PC2, R6 as default-gateway, and for PC3 SwR4as default gateway)

Spanning Tree and OSPF Cost Adjustments: OSPF costs were adjusted to optimize routing paths. B8's Spanning Tree priority was set to 32760, B9 had a Spanning Tree cost of 40 on interface f1/1, and SwR2 had a Spanning Tree cost of 10 on interface f1/0.

R10 Configuration: Configured with RIP for specific network ranges and two loopback interfaces with unique IP addresses (10.0.1.1/24 and 10.1.1.1/24)

These configurations collectively contributed to efficient network routing, optimal path selection, and effective traffic management across the network.

A better view of our configuration can also be seen here:

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