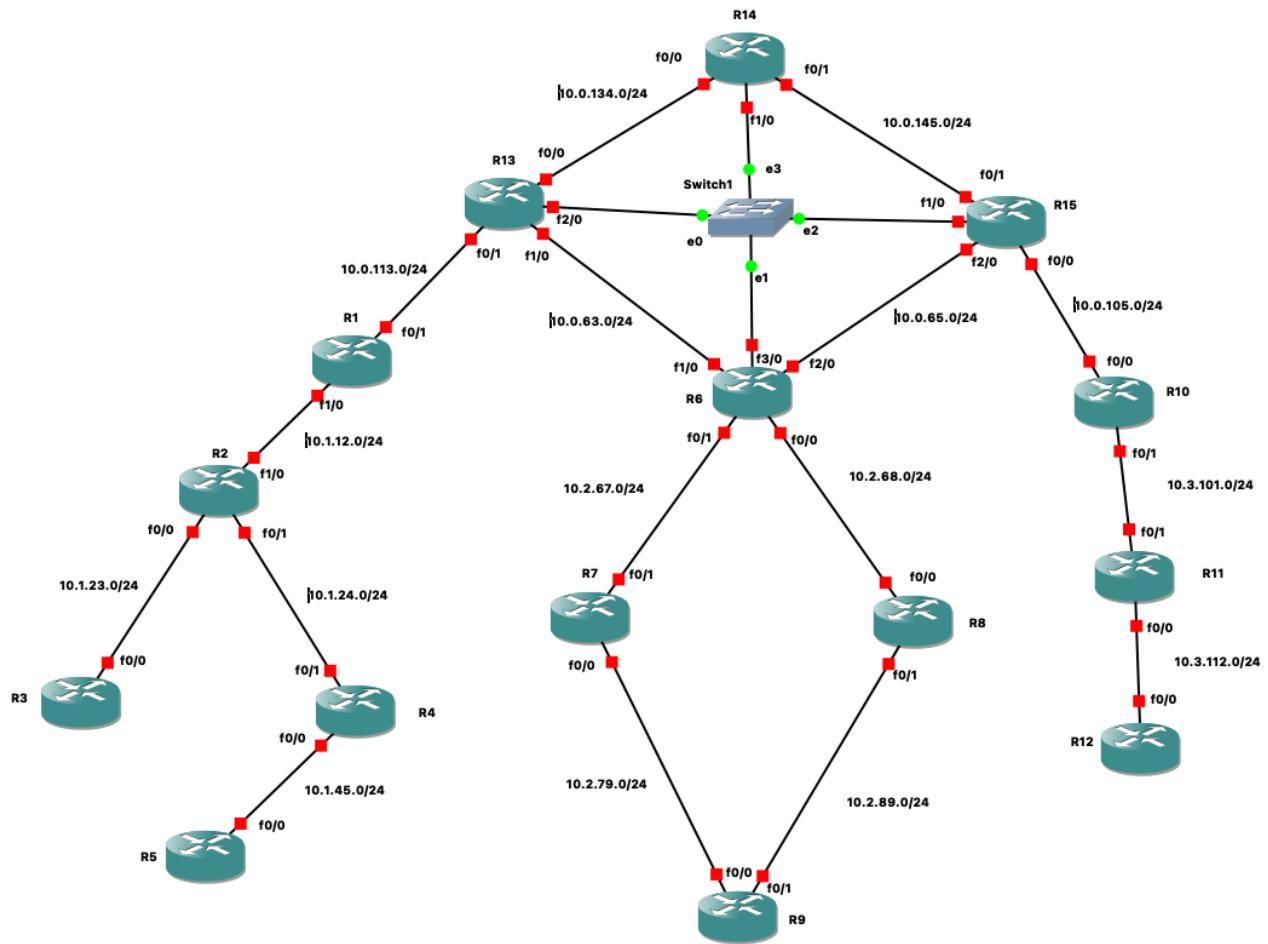


# Lab 4: OSPF

This lab exercise introduces fundamental network analysis and simulation tools used in professional environments. You will work with Wireshark, a powerful packet capture and analysis tool, alongside GNS3, a network emulator that allows you to set up and configure realistic network topologies. The exercises will focus on Cisco routers, providing hands-on experience configuring and observing routing protocols and network behavior in a controlled lab environment. This combination of tools and devices will help you deepen your understanding of network communications and troubleshooting processes.



The diagram above represents the OSPF topology studied during the dedicated lecture. The Autonomous System (AS) is divided into four areas. For this lab exercise, please assign Router IDs to the routers following the specified Router ID assignment policy below:

ROUTER ID: R#.R#.R#.R#

## Configuration

Execute this in the following order:

1. Drag and drop all needed network devices and create link connections
2. Set up Auto IDLE
3. Configure all Ips networks
4. Properly install OSPF in all the routers
5. On all routers:
  - a. Ping an IP inside its area/s
  - b. Ping an Ip on another area

## Exercise

### Hello Message Exchange Analysis

Observe and analyze the exchange of OSPF hello messages on routers R11 and R6.

### Router R3 Shutdown and Recovery Impact

Use GNS3 to simulate a failure by stopping router R3. Analyze and describe the impact of R3's unavailability on the network, focusing on routing behavior and OSPF state changes. Using Wireshark and GNS3, capture the network traffic on the 10.1.23.0/24 subnet when you bring router R3 back online. Analyze the packet exchanges to understand the network reconvergence process and neighbor reestablishment.

### Link Failure and Recovery: Network 10.2.79.0/24

Simulate a link failure on the network 10.2.79.0/24. Analyze what happens during the failure and when the link becomes available again, with special focus on routing protocol reactions and link state advertisements.

### Backbone Network Failure and Switch Failure

- Simulate a failure of the link on network 10.0.65.0/24. Observe and analyze the network's response to this backbone failure and its recovery process.
- Then simulate the failure of the switch within area 0 and analyze the network consequences and recovery.