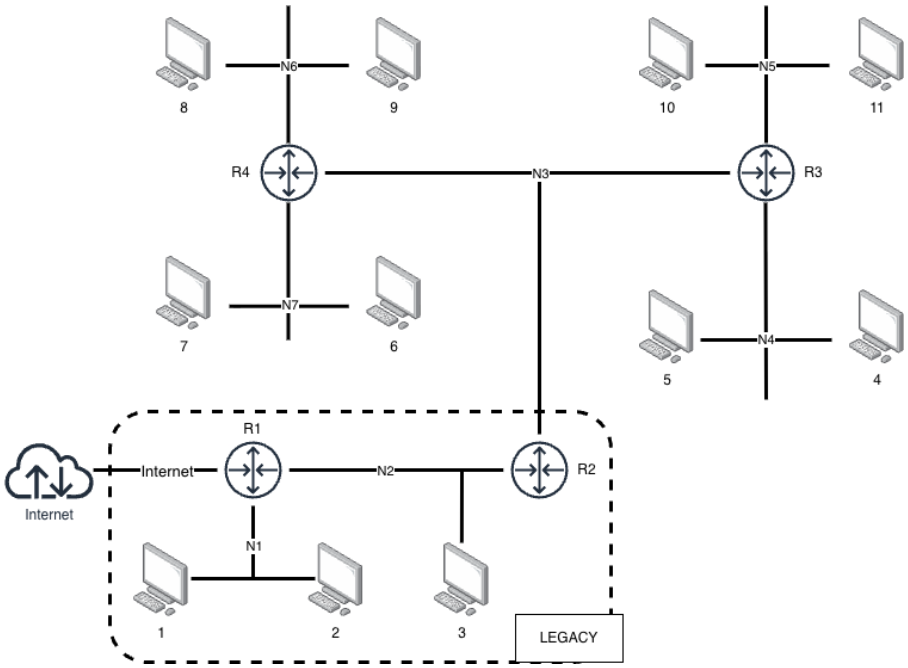
Lab 3: IP Network addressing



Load Plan

The figure represents the topology of a network to be configured. The physical network inside the legacy buildings has a limited number of machines, and this number will remain unchanged in the future. The company has recently acquired a new building, which must be progressively equipped with network devices. In the figure, routers are labeled with "R," subnetworks with "N," and devices with numbers. Given that the system administrator has the address space 189.89.0.0/16, configure the entire network, assuming the legacy network remains stable. You have to justify:

- The chosen addressing plan
- The routing tables configuration

Load Plan – 2

A new router, R5, is attached at the end of subnetwork N7. We want to limit the number of machines connected to each new bus to 30. Reconfigure the network while minimizing changes to the initial addressing plan. Would it have been possible to achieve a better configuration if the presence of Router R5 was known from the beginning?

Configuration and validation

To test your addressing strategy using the load plan, you have to employ the program RoutingSim.exe, where you have to create a topology.txt and config.txt to describe the network. On the lab foldere on the Moodle a configuration example has been provided.

Network topology

The file topologie.txt describe the network topology configuration. This last is done by the command install whose syntax is the following:

```
install n0 bus0 eth0
```

where n0 is the name of the node (station or router) connected to the bus bus0 whose local interface is named eth0.

Network configuration

The network configuration is done through the file config.txt. The two commands employed for this configuration are ifconfig and route. They are inspired to UNIX commands. These commands go after the name of the node that is configured

Ifconfig

The command ifconfig allow to configure the local interfaces and the syntax is the following:

```
ifconfig eth0 129.101.10.10 netmask 255.255.255.0
```

where eth0 is the local configured interface, 129.10.10.10 is the IP address of the interface and 255.255.255.0 is the network mask. You can also write:

ifconfig eth0 129.101.10.10

In this way, the mask will take the default value of the correspondent class of the interface address. In this case the default mask is 255.255.0.0.

Route

The route command allows configuring the routing tables. There are three types of knew syntaxes. The command line:

```
route add default gw 129.101.10.3
```

indicates that the default route pass by the router with address 129.101.10.3. In this way, without any other detail is given, every datagram will be sent by default to this router. The line:

route add -net 129.101.10.0

indicates that the network 129.101.10.0 is directly accessible. The line:

```
route add -net 130.50.0.0 netmask 255.255.0.0 gw 129.101.10.4
```

indicates that all the nodes whose address is 130.50.0.0 with mask 255.255.0.0 are accessible via the router 129.101.10.4.

Validation of the configuration

To validate the configuration of interfaces and nodes routing tables, you have to use the program “RoutingSim.exe”. Firstly, you have to load the files topologie.txt and config.txt, then it is possible to display the path followed by a datagram using the button "Trace" by indicating the source node and its address, and the destination node. The button " Verbose Trace " allow having details about the path chosen by the datagram to reach the destination. The software will always ask you for the source node and IP address (routers have multiple IP addresses), as well as the destination IP address.

Two situations may occur:

- **RoutingSim displays an error message**: In this case, note the possible causes, close the window associated with your simulation, edit your files again, and restart.
- **RoutingSim does not display any error message:** Normally, this indicates that it found no syntax errors (typos, incorrect IP address, unknown local interface name, etc.)
    - By clicking on “Topology,” the software displays the topology of your network as it recognized it, allowing you to verify that it matches your actual network.
    - By clicking on “Routing Table,” RoutingSim shows the routing tables for each node in your network.