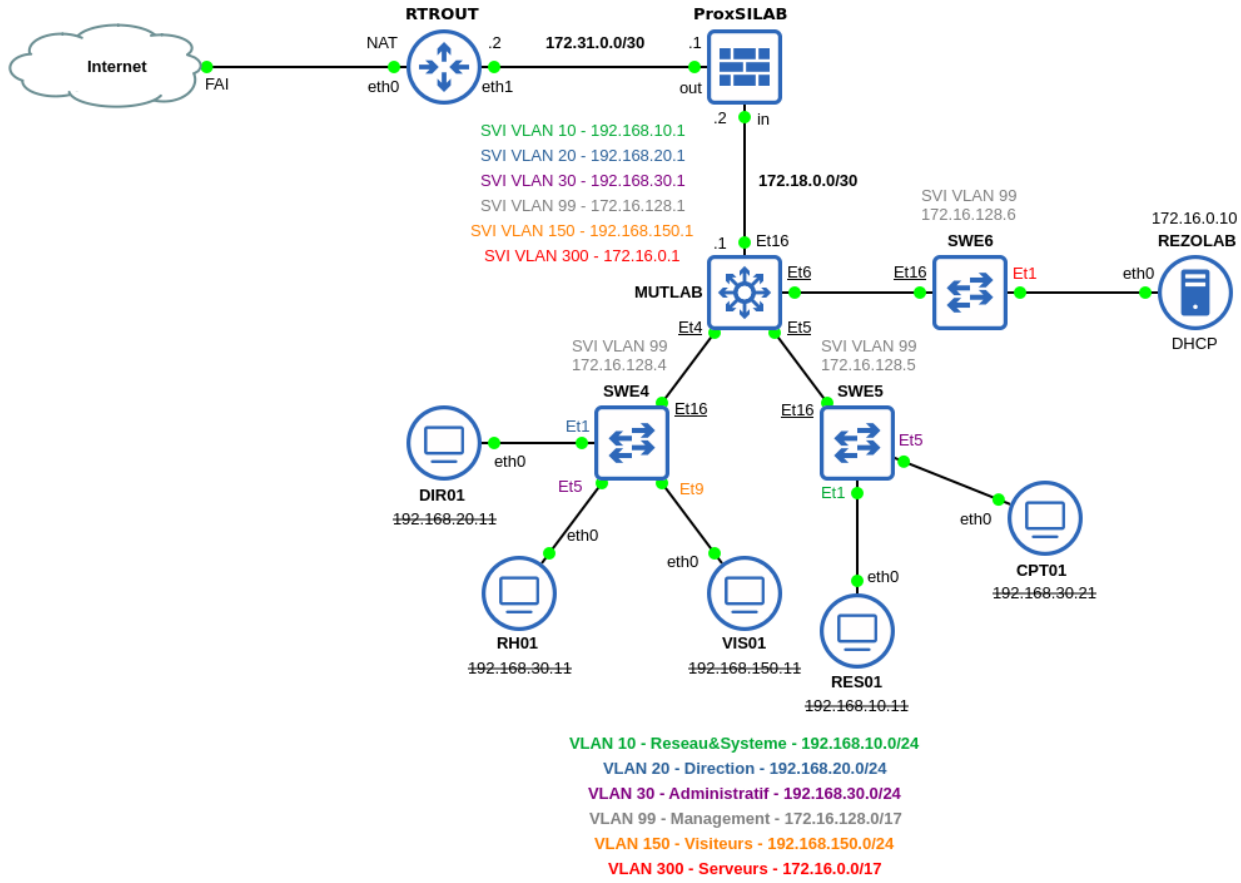
Mise en œuvre d'un serveur DHCP dans le réseau de GSB

Correction

Le serveur DHCP centralise et gère l'attribution des informations de configuration TCP/IP en fournissant une adresse IP, un masque de sous réseau, une passerelle et un serveur DNS aux hôtes qui en font la demande.

Dans ce TP, vous allez installer et configurer un serveur DHCP pour le réseau de GSB sur la machine **REZOLAB** s'exécutant sous système d'exploitation Rocky Linux.

Schéma réseau de la plateforme



Le service DHCP sera configuré sur le serveur **REZOLAB**.

Les postes clients **DIR01**, **RH01**, **VIS01**, **RES01**, **CPT01** devront être configurés pour obtenir leurs paramètres IP via DHCP.

Installation et configuration du serveur DHCP

En vous aidant de l'*annexe 1* :

➔ Installez le service DHCP sur **REZOLAB**.

```
[root@rezolab ~]# dnf install dhcp-server
```

➔ Modifiez le fichier de configuration `dhcpd.conf` afin de respecter les contraintes suivantes :

- La durée du bail sera de 2 heures.
- Le serveur DHCP gérera les plages d'adresses des VLAN utilisateurs c'est à dire les VLAN 10, 20, 30 et150. Les 10 premières et 5 dernières adresses seront réservées à l'adressage statique et par conséquent non offertes.
- Les adresses IP des passerelles des VLAN 10, 20, 30 et 150 devront être fournies.
- Le serveur DNS à renseigner sera celui du FAI 100.64.122.1.

```
[root@rezolab dhcp]# cat dhcpd.conf
#
# DHCP Server Configuration file.
#   see /usr/share/doc/dhcp-server/dhcpd.conf.example
#   see dhcpd.conf(5) man page
#

# Serveur DNS
option domain-name-servers 100.64.122.1;

# Bail de 2 heures
default-lease-time 7200;

authoritative;

# VLAN 10 - Reseau&Systeme
subnet 192.168.10.0 netmask 255.255.255.0 {
   range 192.168.10.11 192.168.10.249;
   option routers 192.168.10.1;
}

# VLAN 20 - Direction
subnet 192.168.20.0 netmask 255.255.255.0 {
   range 192.168.20.11 192.168.20.249;
   option routers 192.168.20.1;
}

# VLAN 30 - Administratif
subnet 192.168.30.0 netmask 255.255.255.0 {
   range 192.168.30.11 192.168.30.249;
   option routers 192.168.30.1;
```

```
}

# VLAN 150 - Visiteurs
subnet 192.168.150.0 netmask 255.255.255.0 {
   range 192.168.150.11 192.168.150.249;
   option routers 192.168.150.1;
}

# VLAN 300 - Serveurs
subnet 172.16.0.0 netmask 255.255.128.0 {
}
```

➔ Démarrez le service dhcpd et activez le lancement automatique de celui-ci au démarrage du serveur.

```
[root@rezolab dhcp]# systemctl start dhcpd
[root@rezolab dhcp]# systemctl enable dhcpd
Created symlink /etc/systemd/system/multi-user.target.wants/dhcpd.service →
/usr/lib/systemd/system/dhcpd.service.
```

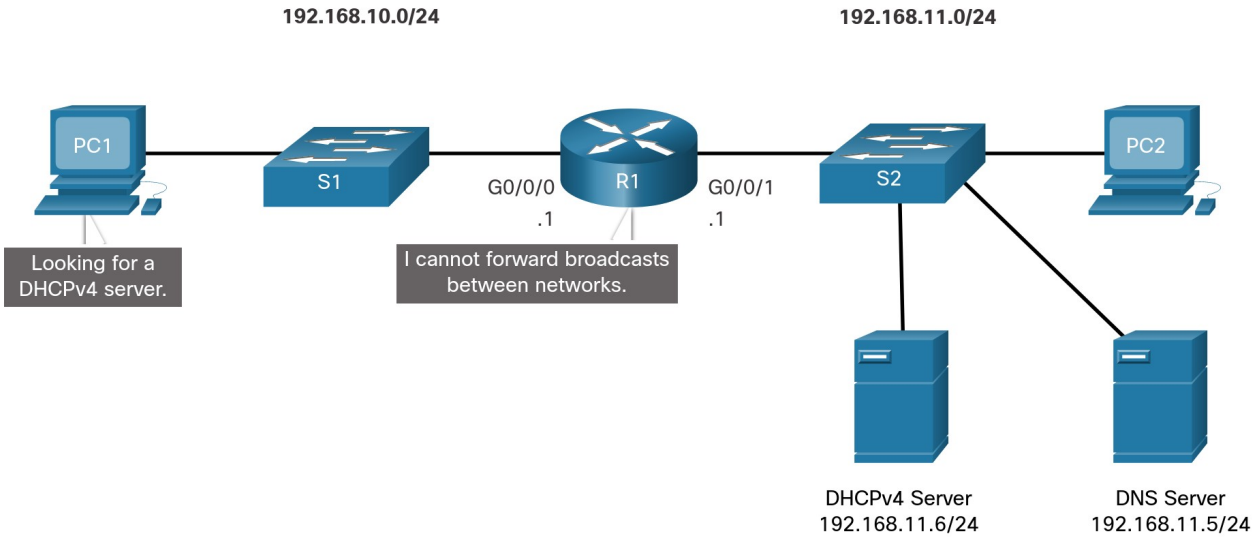
Remarque
A chaque modification du fichier `dhcpd.conf` il faut redémarrer le service dhcpd afin que les modifications soient prises en compte.

Travail à faire
Rédigez une documentation technique succincte expliquant les paramètres de votre serveur DHCP.

Configuration de l'agent relais DHCP sur MUTLAB

In a complex hierarchical network, enterprise servers are usually located centrally. These servers may provide DHCP, DNS, TFTP, and FTP services for the network. Network clients are not typically on the same subnet as those servers. In order to locate the servers and receive services, clients often use broadcast messages.

In the figure, PC1 is attempting to acquire an IPv4 address from a DHCPv4 server using a broadcast message. In this scenario, R1 is not configured as a DHCPv4 server and does not forward the broadcast. Because the DHCPv4 server is located on a different network, PC1 cannot receive an IP address using DHCP. R1 must be configured to relay DHCPv4 messages to the DHCPv4 server.



The network administrator could add DHCPv4 servers on R1 for all subnets. However, this would create additional cost and administrative overhead.

A better solution is to configure R1 with the **ip helper-address** *address* interface configuration command. This will cause R1 to relay DHCPv4 broadcasts to the DHCPv4 server. As shown in the example, the interface on R1 receiving the broadcast from PC1 is configured to relay DHCPv4 address to the DHCPv4 server at 192.168.11.6.

```
R1(config)# interface g0/0/0
R1(config-if)# ip helper-address 192.168.11.6
R1(config-if)# end
R1#
```

➔ En vous aidant de l'*annexe 2*, configurez l'agent relais sur le commutateur de niveau 3 afin de permette aux hôtes du réseau qui le souhaite de récupérer des paramètres IP auprès du serveur DHCP **REZOLAB**.

```
MUTLAB(config)#interface vlan 10
MUTLAB(config-if-Vl10)#ip helper-address 172.16.0.10
```

```
MUTLAB(config-if-Vl10)#interface vlan 20
MUTLAB(config-if-Vl20)#ip helper-address 172.16.0.10
MUTLAB(config-if-Vl20)#interface vlan 30
MUTLAB(config-if-Vl30)#ip helper-address 172.16.0.10
MUTLAB(config-if-Vl30)#interface vlan 150
MUTLAB(config-if-Vl150)#ip helper-address 172.16.0.10
MUTLAB(config-if-Vl150)#show ip dhcp relay
DHCP relay is active
DHCP relay information option (82) is disabled
DHCPv6 relay link-layer address option (79) is disabled
DHCPv6 relay remote ID option (37) encoding format: MAC address:interface ID
DHCP all subnet relaying is disabled
DHCPv6 all subnet relaying is disabled
Interface: Vlan10
  DHCP all subnet relaying is disabled
  DHCPv6 all subnet relaying is disabled
  DHCPv4 servers: 172.16.0.10
Interface: Vlan20
  DHCP all subnet relaying is disabled
  DHCPv6 all subnet relaying is disabled
  DHCPv4 servers: 172.16.0.10
Interface: Vlan30
  DHCP all subnet relaying is disabled
  DHCPv6 all subnet relaying is disabled
  DHCPv4 servers: 172.16.0.10
Interface: Vlan150
  DHCP all subnet relaying is disabled
  DHCPv6 all subnet relaying is disabled
  DHCPv4 servers: 172.16.0.10
```

Modification des paramètres réseau des clients DHCP

➔ Modifiez la configuration réseau des postes **DIR01**, **RH01**, **VIS01**, **RES01** et **CPT01** afin qu'ils obtiennent leurs paramètres IP de manière dynamique. Vérifiez et validez les paramètres IP obtenus par les machines.

```
#
# This is a sample network config uncomment lines to configure the network
#


# Static config for eth0
#auto eth0
#iface eth0 inet static
#     address 192.168.0.2
#     netmask 255.255.255.0
#     gateway 192.168.0.1
#     up echo nameserver 100.64.122.1 > /etc/resolv.conf
```

```
# DHCP config for eth0
auto eth0
iface eth0 inet dhcp
```

Depuis RH01 :

```
root@RH01:/# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group
default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
59: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state
UNKNOWN group default qlen 1000
    link/ether 0e:02:47:9a:d6:b2 brd ff:ff:ff:ff:ff:ff
    inet 192.168.30.11/24 scope global eth0
       valid_lft forever preferred_lft forever
    inet6 fe80::c02:47ff:fe9a:d6b2/64 scope link
       valid_lft forever preferred_lft forever
```

Travail à faire
Proposez un jeu de tests qui permet de valider vos configurations.

Depuis RH01 :

```
root@RH01:/# ping -c 2 192.168.10.11
PING 192.168.10.11 (192.168.10.11) 56(84) bytes of data.
64 bytes from 192.168.10.11: icmp_seq=1 ttl=64 time=48.6 ms
64 bytes from 192.168.10.11: icmp_seq=2 ttl=64 time=16.5 ms

--- 192.168.10.11 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 16.469/32.534/48.599/16.065 ms
root@RH01:/# ping -c 2 192.168.20.11
PING 192.168.20.11 (192.168.20.11) 56(84) bytes of data.
64 bytes from 192.168.20.11: icmp_seq=1 ttl=64 time=14.6 ms
64 bytes from 192.168.20.11: icmp_seq=2 ttl=64 time=16.0 ms

--- 192.168.20.11 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 14.590/15.313/16.037/0.723 ms
root@RH01:/# ping -c 2 192.168.30.12
PING 192.168.30.12 (192.168.30.12) 56(84) bytes of data.
64 bytes from 192.168.30.12: icmp_seq=1 ttl=64 time=13.3 ms
64 bytes from 192.168.30.12: icmp_seq=2 ttl=64 time=14.8 ms

--- 192.168.30.12 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 13.250/14.028/14.807/0.778 ms
```

```
root@RH01:/# ping -c 2 192.168.150.11
PING 192.168.150.11 (192.168.150.11) 56(84) bytes of data.
64 bytes from 192.168.150.11: icmp_seq=1 ttl=64 time=14.0 ms
64 bytes from 192.168.150.11: icmp_seq=2 ttl=64 time=14.7 ms

--- 192.168.150.11 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 13.956/14.352/14.749/0.396 ms
```

Annexe 1 – Extrait de la documentation de Red Hat

Setting up the DHCP service for subnets that are not directly connected to the DHCP server[1]

Use the following procedure if the DHCP server is not directly connected to the subnet for which the server should answer DHCP requests. This is the case if a DHCP relay agent forwards requests to the DHCP server, because none of the DHCP server's interfaces is directly connected to the subnet the server should serve.

Prerequisites

- You are logged in as the `root` user.
- The `dhcp-server` package is installed.

Procedure

- For IPv4 networks:
  - Edit the `/etc/dhcp/dhcpd.conf` file:
    i. Optionally, add global parameters that `dhcpd` uses as default if no other directives contain these settings:

    ```
    option domain-name "example.com";
    default-lease-time 86400;
    ```

    This example sets the default domain name for the connection to `example.com`, and the default lease time to `86400` seconds (1 day).

    ii. Add the `authoritative` statement on a new line:

    ```
    authoritative;
    ```

    Important

    Without the `authoritative` statement, the `dhcpd` service does not answer `DHCPREQUEST` messages with `DHCPNAK` if a client asks for an address that is outside of the pool.

    iii. Add a `shared-network` declaration, such as the following, for IPv4 subnets hat are not directly connected to an interface of the server:

    ```
    shared-network example {
      option domain-name-servers 192.0.2.1;
    ```

1 https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html/managing_networking_infrastructure_services/providing-dhcp-services_networking-infrastructure-services#setting-up-the-dhcp-service-for-subnets-that-are-not-directly-connected-to-the-dhcp-server_providing-dhcp-services

Contrairement à ce qu'indique la documentation de Redhat, ll ne faut pas utiliser la directive shared-network.

```
...

subnet 192.0.2.0 netmask 255.255.255.0 {
  range 192.0.2.20 192.0.2.100;
  option routers 192.0.2.1;
}

subnet 198.51.100.0 netmask 255.255.255.0 {
  range 198.51.100.20 198.51.100.100;
  option routers 198.51.100.1;
}
...
}
```

This example adds a shared network declaration, that contains a `subnet` declaration for both the 192.0.2.0/24 and 198.51.100.0/24 networks. With this configuration, the DHCP server assigns the following settings to a client that sends a DHCP request from one of these subnets:

- The IP of the DNS server for clients from both subnets is: `192.0.2.1`.
- A free IPv4 address from the range defined in the `range` parameter, depending on from which subnet the client sent the request.
- The default gateway is either `192.0.2.1` or `198.51.100.1` depending on from which subnet the client sent the request.

iv. Add a `subnet` declaration for the subnet the server is directly connected to and that is used to reach the remote subnets specified in `shared-network` above:

```
subnet 203.0.113.0 netmask 255.255.255.0 {
}
```

Note

If the server does not provide DHCP service to this subnet, the `subnet` declaration must be empty as shown in the example. Without a declaration for the directly connected subnet, `dhcpd` does not start.

- Optionally, configure that `dhcpd` starts automatically when the system boots:

```
# systemctl enable dhcpd
```

- Start the `dhcpd` service:

```
# systemctl start dhcpd
```

Annexe 2 : Configuration de l'agent relais sous Arista EOS

ip helper-address

The **ip helper-address** command enables the DHCP relay agent on the configuration mode interface and specifies a forwarding address for DHCP requests.

Example :

This command enables DHCP relay on the VLAN interface *200*; and configure the switch to forward DHCP requests received on this interface to the server at *10.10.41.15*.

```
switch(config)#interface vlan 200
switch(config-if-Vl200)#ip helper-address 10.10.41.15
switch(config-if-Vl200)#show active
interface Vlan200
 ip helper-address 10.10.41.15
switch(config-if-Vl200)#
```

show ip dhcp relay

The **show ip dhcp relay** command displays the DHCP relay agent configuration status on the switch.

Example:

This command displays the DHCP relay agent configuration status.

```
switch>show ip dhcp relay
DHCP Relay is active
DHCP Relay Option 82 is disabled
DHCP Smart Relay is enabled
Interface: Vlan100
DHCP Smart Relay is disabled
DHCP servers: 10.4.4.4
switch>
```