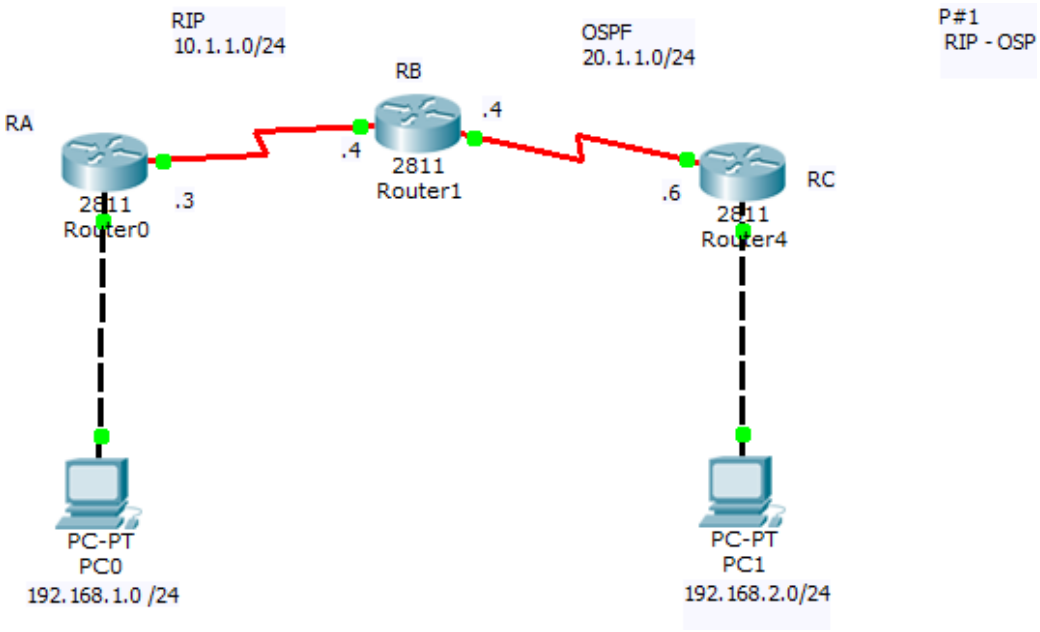
IPV6, NAT y Frame Relay
REDES CISCO

Eduardo V. Abad

PRÁCTICA 1
PROTOCOLO RIP CON OSPF

Construir la siguiente topología de red en CISCO Packet Tracer.



El objetivo de la siguiente práctica es combinar ambos protocolos de enrutamiento existentes. Es decir configurar un router con protocolo RIP y configurar uno más con protocolo OSPF.

Es decir como ya se sabe ambos protocolos de enrutamiento tiene el mismo objetivo que es habilitar las comunicaciones en una red, pero estos protocolos tiene diferente forma de configuración y comportamiento.

Notas: RIP ROUTER RA.

router rip
versión 2
network (aquí va la red que se desea agregar).

Notas: OSPF ROUTER RC

Router ospf 7

Línea importante en la configuración de OSPF.

Log-adjencency-changes .....LINEA IMPORTANTE.

Router RB lineas importantes.

Log-adjacency-changes

Router rip

Version 2

Redistribute ospf 7 metric 7

No auto-summary

Lo que se debe ver en cada uno de los routers para verificar que la configuración se hizo adecuadamente Con el comando: **sh ip route Router RA**.

```
Router>enable
Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, Serial0/1/0
     20.0.0.0/24 is subnetted, 1 subnets
R       20.1.1.0 [120/15] via 10.1.1.4, 00:00:25, Serial0/1/0
C    192.168.1.0/24 is directly connected, FastEthernet0/0
R    192.168.2.0/24 [120/15] via 10.1.1.4, 00:00:25, Serial0/1/0
Router#
```

Router RB

```
Router>ENABLE
Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, Serial0/3/0
     20.0.0.0/24 is subnetted, 1 subnets
C       20.1.1.0 is directly connected, Serial0/3/1
R    192.168.1.0/24 [120/1] via 10.1.1.3, 00:00:25, Serial0/3/0
O    192.168.2.0/24 [110/65] via 20.1.1.6, 00:14:04, Serial0/3/1
```

ROUTER RC

```
Router>enable
Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
O E2    10.1.1.0 [110/20] via 20.1.1.4, 00:14:34, Serial0/3/0
     20.0.0.0/24 is subnetted, 1 subnets
C       20.1.1.0 is directly connected, Serial0/3/0
O E2 192.168.1.0/24 [110/20] via 20.1.1.4, 00:14:34, Serial0/3/0
C    192.168.2.0/24 is directly connected, FastEthernet0/0
Router#
```

Nótese que la configuración se aplicó correctamente ya que la información del router rc, muestra la conexión de protocolos ajenos.

.

Con la prueba ping damos por terminada esta práctica:

```
Packet Tracer PC Command Line 1.0
PC>PING 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Request timed out.
Reply from 192.168.2.1: bytes=32 time=2ms TTL=125
Reply from 192.168.2.1: bytes=32 time=2ms TTL=125
Reply from 192.168.2.1: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 2ms, Average = 2ms

PC>
```

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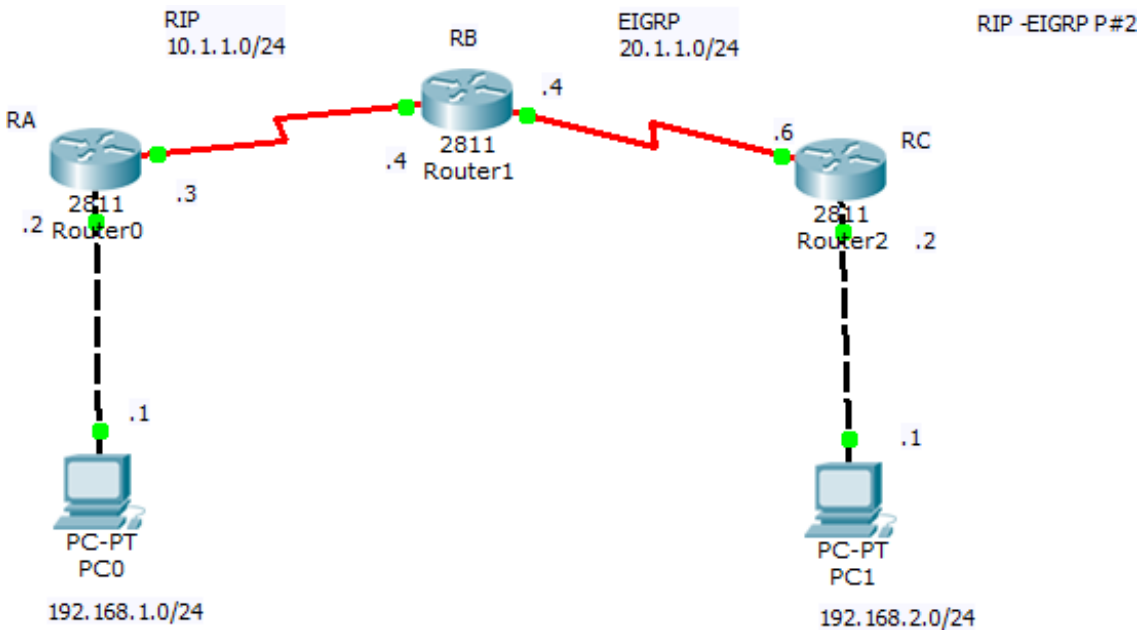
PRÁCTICA 2
PRTOCOLO RIP CON EIGRP



En la siguiente topología se muestra la configuración entre los protocolos de enrutamiento RIP – EIGRP.

Configuraciones importantes:

RC:

Router eigrp 7
Network (red que se desea gregar). Auto-summary.

RB:

Redistribute rip metric 10000 1 255 1 1500 Auto-sumary

Router rip Versión 2
Redistribute eigrp 7 metric
15 No auto–sumary

Salidas de configuración en los Router´s:

- **RA**

```
Router>enable
Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, Serial0/3/0
     20.0.0.0/24 is subnetted, 1 subnets
R       20.1.1.0 [120/15] via 10.1.1.4, 00:00:15, Serial0/3/0
C    192.168.1.0/24 is directly connected, FastEthernet0/0
R    192.168.2.0/24 [120/15] via 10.1.1.4, 00:00:15, Serial0/3/0
Router#
```

- **RB**

```
% Invalid input detected at '^' marker.

Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, Serial0/3/0
     20.0.0.0/24 is subnetted, 1 subnets
C       20.1.1.0 is directly connected, Serial0/3/1
R    192.168.1.0/24 [120/1] via 10.1.1.3, 00:00:20, Serial0/3/0
D    192.168.2.0/24 [90/2172416] via 20.1.1.6, 00:03:57, Serial0/3/1
Router#
```

- **RC**

```
Router>enable
Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
D EX    10.1.1.0 [170/2169856] via 20.1.1.4, 00:04:41, Serial0/3/0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       20.0.0.0/8 is a summary, 00:04:42, Null0
C       20.1.1.0/24 is directly connected, Serial0/3/0
D EX 192.168.1.0/24 [170/2169856] via 20.1.1.4, 00:04:41, Serial0/3/0
C    192.168.2.0/24 is directly connected, FastEthernet0/0
```

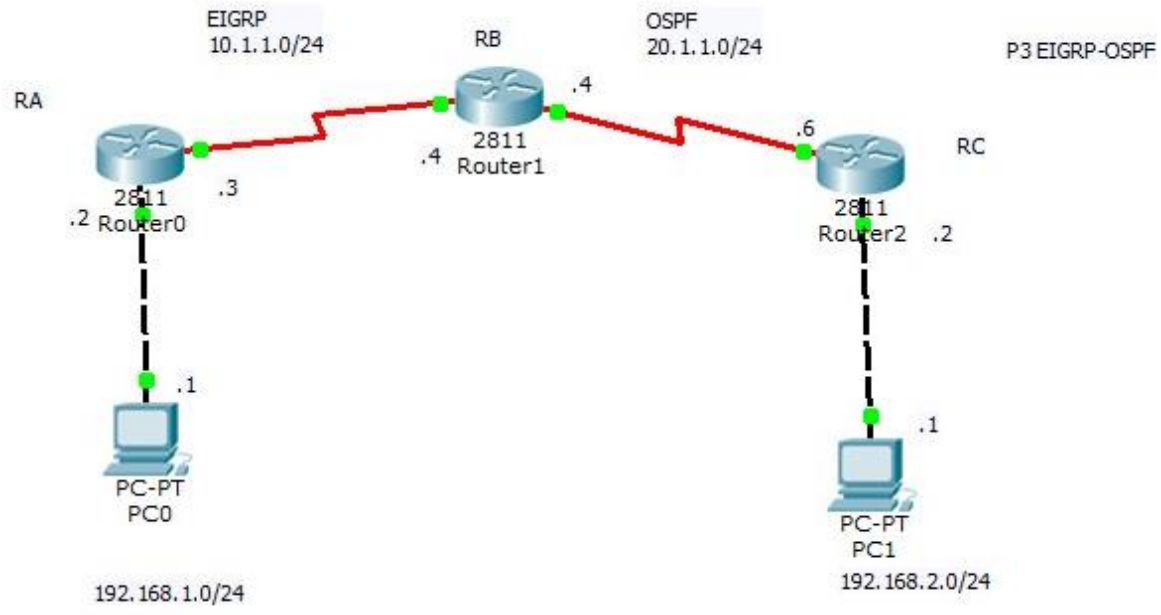
Véase que en router RC, se muestra en la tabla de enrutamiento la conexión de protocolo externo.

Test ping para validar que todo es correcto:

```
Packet Tracer PC Command Line 1.0
PC>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.1: bytes=32 time=17ms TTL=125
Reply from 192.168.1.1: bytes=32 time=22ms TTL=125
Reply from 192.168.1.1: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 22ms, Average = 13ms

PC>
```

PRÁCTICA 3
PROTOCOLO OSPF CON EIGRP

En la siguiente topología se muestra la configuración entre los protocolos de enrutamiento OSPF – EIGRP.



Salidas en los router's:

Entiéndase como EX, protocolo externo conectado.
LINEAS IMPORTANTES:

RA:
Router eigrp 7
Network ……
Auto-sumary

RC:
Router ospf 7
Log –adjacency-
changes
Network……

Router eigrp 7
Redistribute ospf 7 metric 1000 100 255 11500
Auto-sumary

Router ospf 7
Log-adjacency-changes

RA:

```
Router>enable
Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       10.0.0.0/8 is a summary, 00:01:46, Null0
C       10.1.1.0/24 is directly connected, Serial0/3/0
     20.0.0.0/24 is subnetted, 1 subnets
D EX    20.1.1.0 [170/2195456] via 10.1.1.4, 00:01:37, Serial0/3/0
C    192.168.1.0/24 is directly connected, FastEthernet0/0
D EX 192.168.2.0/24 [170/2195456] via 10.1.1.4, 00:01:31, Serial0/3/0
Router#
```

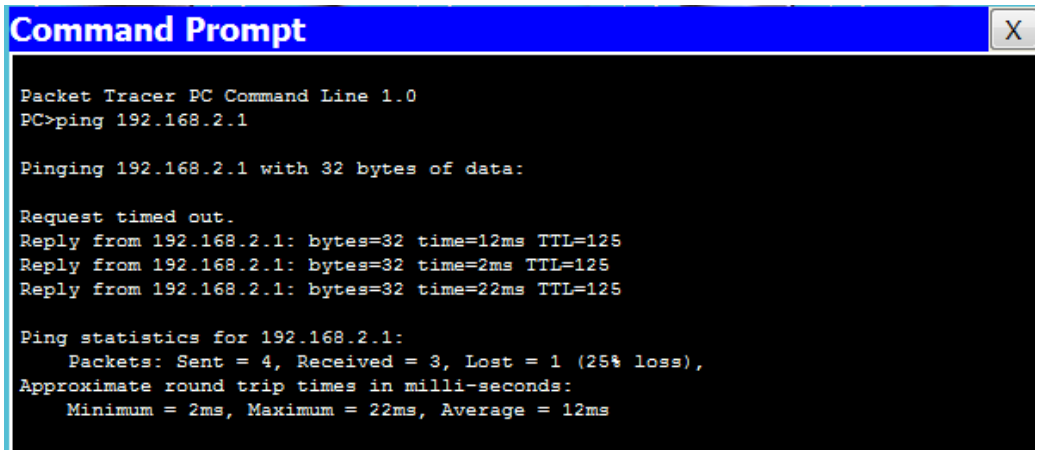
RB:

```
%DUAL-5-NBRCHANGE: IP-EIGRP 7: Neighbor 10.1.1.3 (Serial0/3/0) is up: new adjace
ncy

00:00:10: %OSPF-5-ADJCHG: Process 7, Nbr 192.168.2.2 on Serial0/3/1 from LOADING
 to FULL, Loading Done


Router>enable
Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, Serial0/3/0
     20.0.0.0/24 is subnetted, 1 subnets
C       20.1.1.0 is directly connected, Serial0/3/1
D    192.168.1.0/24 [90/2172416] via 10.1.1.3, 00:02:20, Serial0/3/0
O    192.168.2.0/24 [110/65] via 20.1.1.6, 00:02:15, Serial0/3/1
Router#
```

RC:

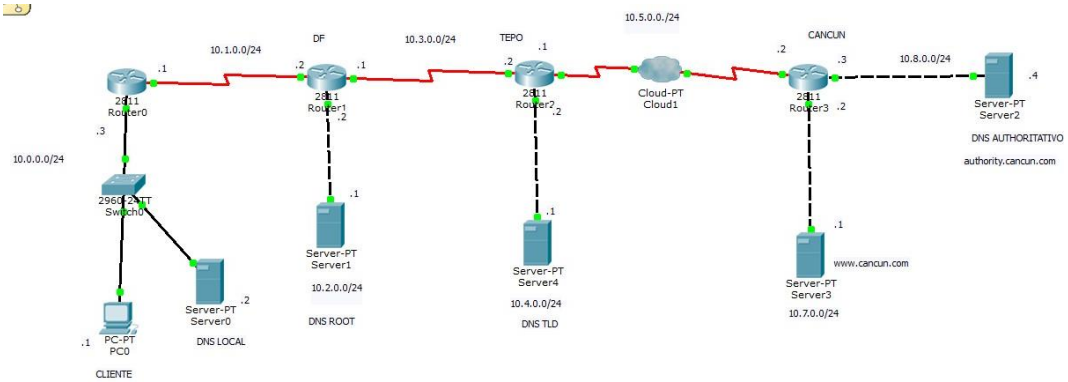
```
Router>enable
Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter ar
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
O E2    10.1.1.0 [110/20] via 20.1.1.4, 00:02:52, Serial0/3/0
     20.0.0.0/24 is subnetted, 1 subnets
C       20.1.1.0 is directly connected, Serial0/3/0
O E2 192.168.1.0/24 [110/20] via 20.1.1.4, 00:02:52, Serial0/3/0
C    192.168.2.0/24 is directly connected, FastEthernet0/0
Router#
```

PING



PRÁCTICA 4
FRAME RALAY

Construir el siguiente esquema DNS, con los conocimientos adquiridos en la materia de servidores. Solo se emplea Frame Relay como medio físico de comunicación.



Frame Relay:

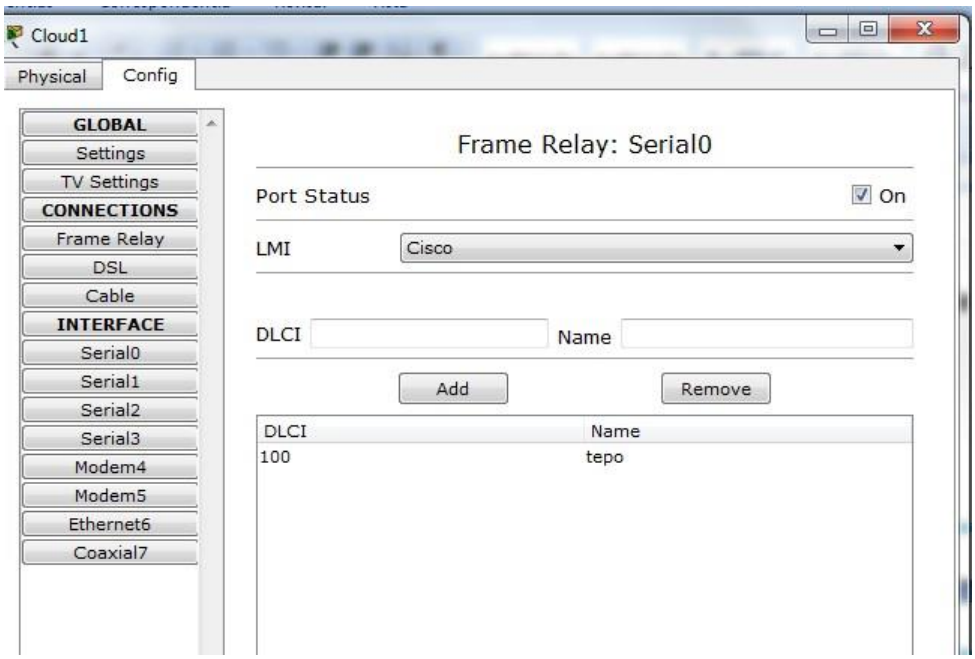
Es una configuración para los router's que provee de un medio de comunicación físico, que tiene la característica, de mantener un ancho de banda dentro de una red. Es decir una tecnología incorporada en los

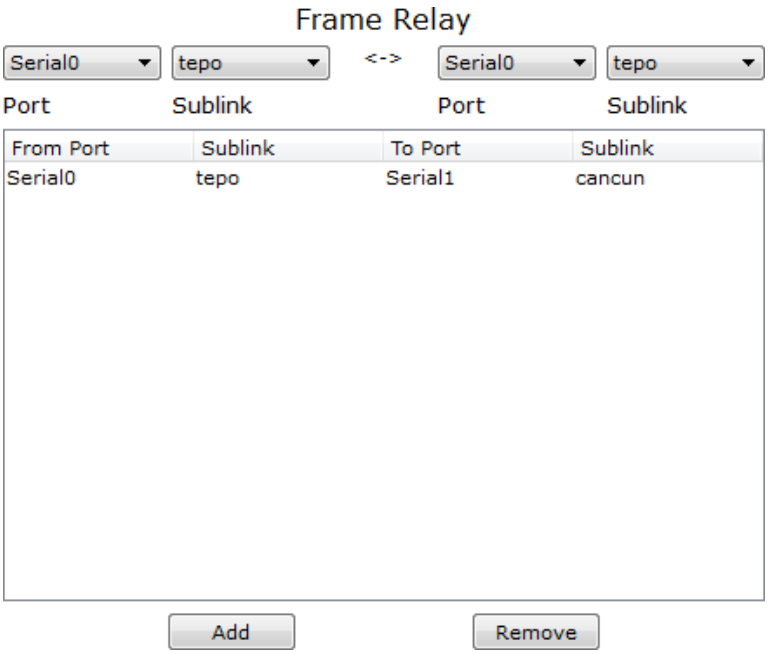
router’s cisco. Esto dará como garantía, una comunicación eficiente. Entre las redes.

Configuración de Frame Relay:

Config t
Int s0/0
Encapuslation frame-relay
Ip address 192.168.6.1 255.255.255.0
Frame-relay interface-dlci 101
>z

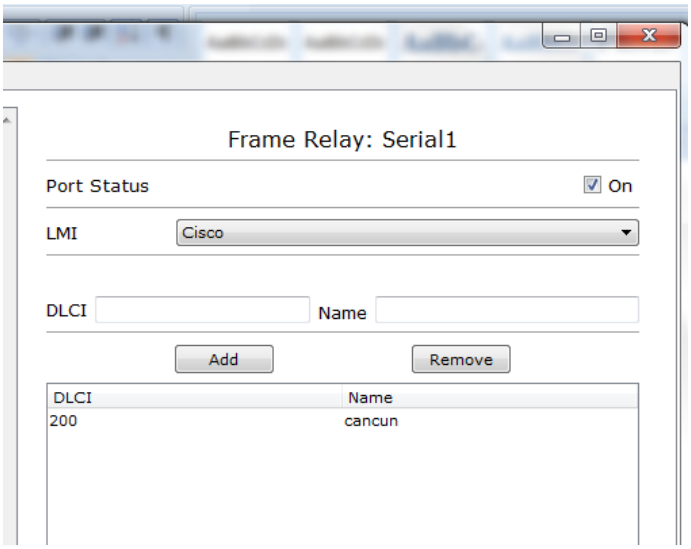
Eso se hace dentro de la consola de configuración de un extremo del frame relay:





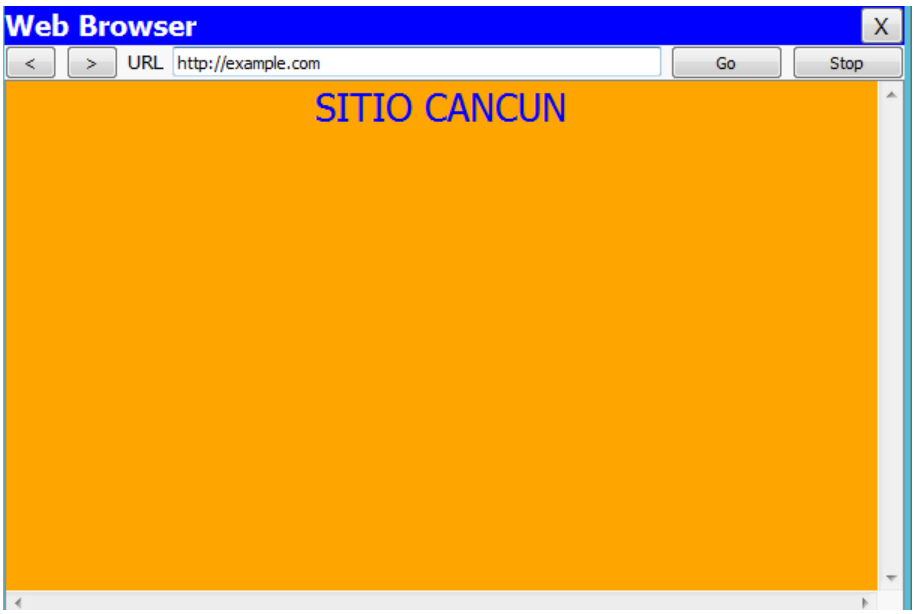
En el otro extremo del frame relay. (Osea en el router del otro extremo).

Config t
Int s1/0
Encapuslation frame-relay
Ip address 192.168.6.2 255.255.255.0
Frame-relay interface-dlci 201
>z



El dlci y el número de la interface, va depender de la configuración de la interfaz del lado que se encuentra.

Test de funcionamiento:



PRÁCTICA 5
IPV6 RIP

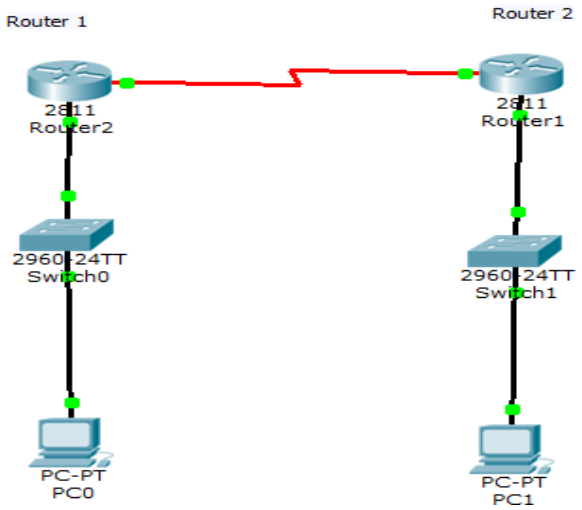
Se debe construir el siguiente esquema de red. Para aplicar la opción de ipv6 unicast, Es decir realizar una manera de enrutamiento que permita la conexión entre dos redes utilizando ipv6. Anteriormente cualquier protocolo de enrutamiento existente para la comunicación entre redes, solo está diseñado para tecnologías ipv4.

IPV6 unicast routing: Es el protocolo que permite la comunicación entre host, configurados con ipv6.

IPV6, NAT y Frame Relay
REDES CISCO

Eduardo V. Abad

Construir la siguiente topología de red:



Colocar la siguiente, topología en los routers correspondientes:

PC1: 2000::1

PC2: 2002::2

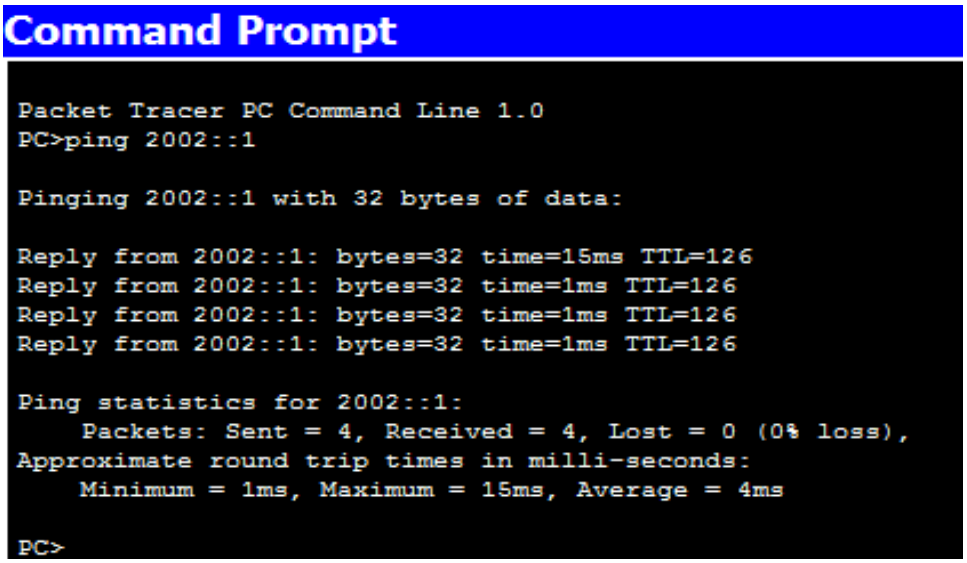
router 1

```
#config t
#ipv6 unicast-routing
#interface se0/0/0
#ipv6 address 2001::1/64
#clock rate 56000
#^Z

#interface se0/0/0
#ipv6 rip 1 enable
#^Z

#interface se0/0/0
#no shut
#^Z

#interface fa0/0
#ipv6 address 2000::2/64
#^Z
#interface fa0/0
#ipv6 rip 1 enable
#^Z
#
```

router 2

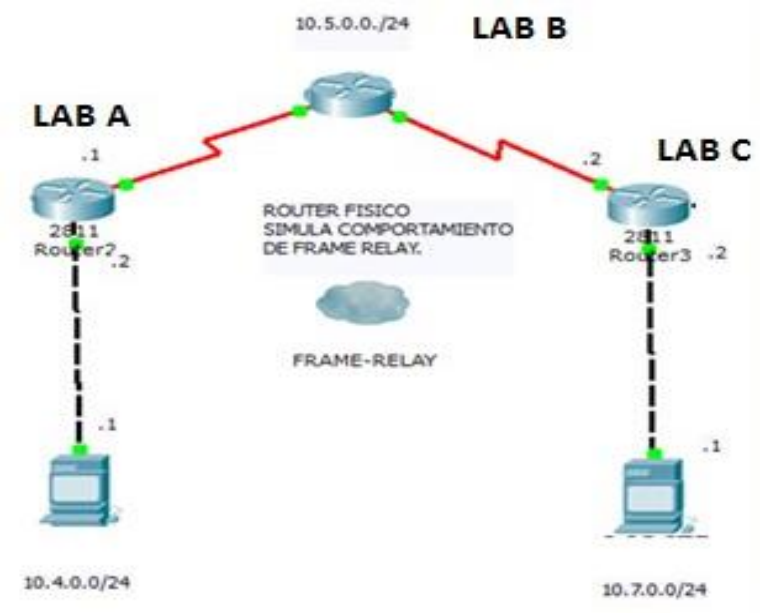
```
#config t
#ipv6 unicast-routing
#interface se0/0/0
#ipv6 address 2001::2/64
#^Z

#interface se0/0/0
#ipv6 rip 1 enable
#^Z

#interface se0/0/0
#no shut
#^Z

#interface fa0/0
#ipv6 address 2002::2/64
#^Z
#interface fa0/0
#ipv6 rip 1 enable
#^Z
#
```

Para checar la configuración se debe realizar la prueba del ping:



Así es como se demuestra la funcionalidad de esta configuración para enrutamiento en ipv6.

PRÁCTICA 6
FRAME RELAY FISICO



Siguiendo la siguiente topología propuesta en el software de simulación Packet Tracer. Se va realizar un puente Frame Relay simulándolo a partir de un router 2811 cisco de manera física:

- Dos clientes con distintas redes.
- Enrutamiento RIP versión 2
- Configuración de Frame Relay.

Constitución guía para la configuración Frame Relay:

- **LAB A**
- **LAB B**
- **LAB C**

En “LAB A“ y “LAB C”, solo se configura un cliente físico asignando el conjunto de IP’S y configurando su modo de enrutamiento así como su router correspondiente para habilitar las interfaces necesarias.

Asignar la siguiente configuración en cada uno de los routers señalados:

1. Set the hostname, frame-relay switching command, and the encapsulation of each serial interface on the Frame Relay switch.

```
Router#config t
Router(config)#hostname Lab_B
Lab_B(config)#frame-relay switching [makes the router an
FR switch]
Lab_B(config)#int s0
Lab_B(config-if)#encapsulation frame-relay
Lab_B(config-if)#int s1
Lab_B(config-if)#encapsulation frame-relay
```

2. Configure the Frame Relay mappings on each interface. You do not have to have IP addresses on these interfaces because they are only switching one interface to another with Frame Relay frames.

```
Lab_B(config-if)#int s0
Lab_B(config-if)#frame intf-type dce
[The above command makes this an FR DCE interface, which
is different than a router's interface being DCE]
Lab_B(config-if)#frame-relay route 102 interface
  Serial0/1 201
Lab_B(config-if)#clock rate 64000
[The above command is used if you have this as DCE, which
is different than an FR DCE]
```

```
Lab_B(config-if)#int s1
Lab_B(config-if)#frame intf-type dce
Lab_B(config-if)#frame-relay route 201 interface
  Serial0/0 102
Lab_B(config-if)#clock rate 64000 [if you have this as DCE]
```

This is not as hard as it looks. The `route` command just says that if you receive frames from PVC 102, send them out `int s0/1` using PVC 201. The second mapping on serial 0/1 is just the opposite. Anything that comes in `int s0/1` is routed out serial0/ 0 using PVC 102.

3. Configure Lab_A with a point-to-point subinterface.

```
Router#config t
Router(config)#hostname Lab_A
Lab_A(config)#int s0
Lab_A(config-if)#encapsulation frame-relay
Lab_A(config-if)#int s0.102 point-to-point
Lab_A(config-if)#ip address 172.16.10.1
  255.255.255.0
Lab_A(config-if)#frame-relay interface-dlci 102
```

4. Configure Lab_C with a point-to-point subinterface.

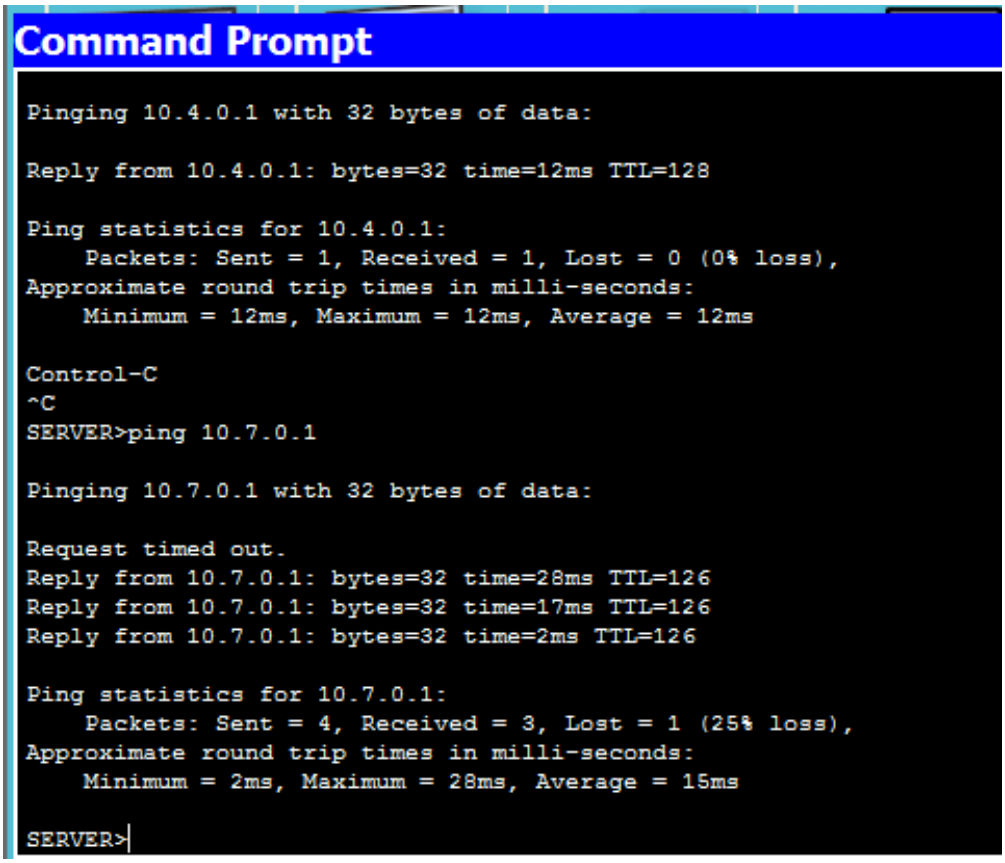
```
Router#config t
Router(config)#hostname Lab_C
Lab_C(config)#int s0
Lab_C(config-if)#encapsulation frame-relay
Lab_C(config-if)#int s0.201 point-to-point
```

```
Lab_C(config-if)#ip address 172.16.10.2
  255.255.255.0
Lab_C(config-if)#frame-relay interface-dlci 201
```

Verify your configurations with the following commands:

```
Lab_A>sho frame ?
 ip       show frame relay IP statistics
 lmi      show frame relay lmi statistics
 map      Frame-Relay map table
 pvc      show frame relay pvc statistics
 route    show frame relay route
 traffic  Frame-Relay protocol statistics
```

Prueba para verificar la conexión correcta haciendo PING físicamente a los dos host:

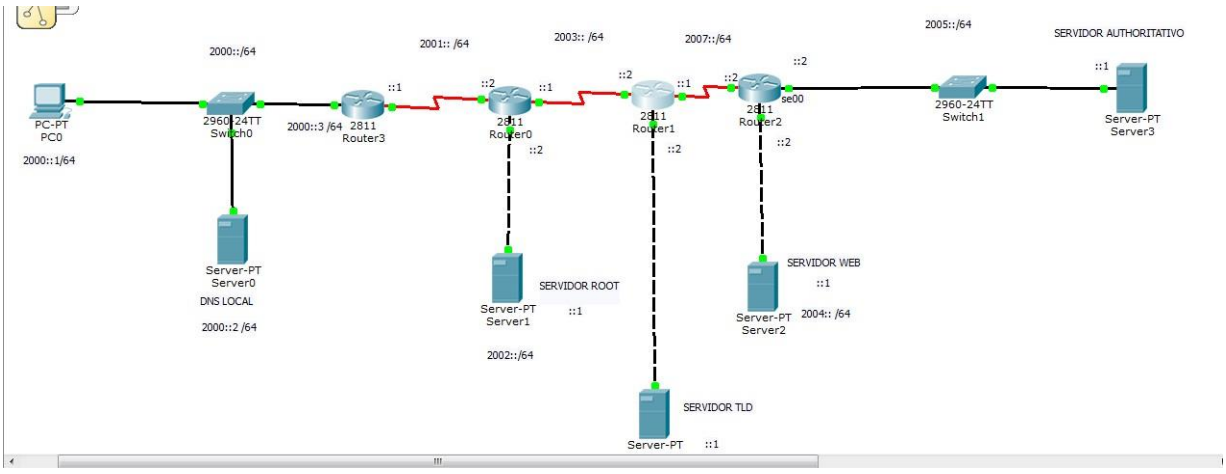


PRÁCTICA 7
UNICAST RIP IPV6- CON DNS

A continuación utilizaremos los conocimientos de la materia de configuración de servidores para aplicar la arquitectura del funcionamiento de un servidor DNS, pero ahora acoplado con ipv6.

Es decir utilizaremos:

- **Cliente**
- **Servidor Dns Local**
- **Servidor ROOT**
- **Servidor TLD.**
- **Servidor Authoritativo.**
- **Servidor Web.**



La configuración de cada router es similar a la de la práctica de routing:

```
router 1

#config t
#ipv6 unicast-routing
#interface se0/0/0
#ipv6 address 2001::1/64
#clock rate 56000
#^Z

#interface se0/0/0
#ipv6 rip 1 enable
#^Z

#interface se0/0/0
#no shut
#^Z

#interface fa0/0
#ipv6 address 2000::2/64
#^Z
#interface fa0/0
#ipv6 rip 1 enable
#^Z
#
```

```
router 2

#config t
#ipv6 unicast-routing
#interface se0/0/0
#ipv6 address 2001::2/64
#^Z

#interface se0/0/0
#ipv6 rip 1 enable
#^Z

#interface se0/0/0
#no shut
#^Z

#interface fa0/0
#ipv6 address 2002::2/64
#^Z
#interface fa0/0
#ipv6 rip 1 enable
#^Z
#
```

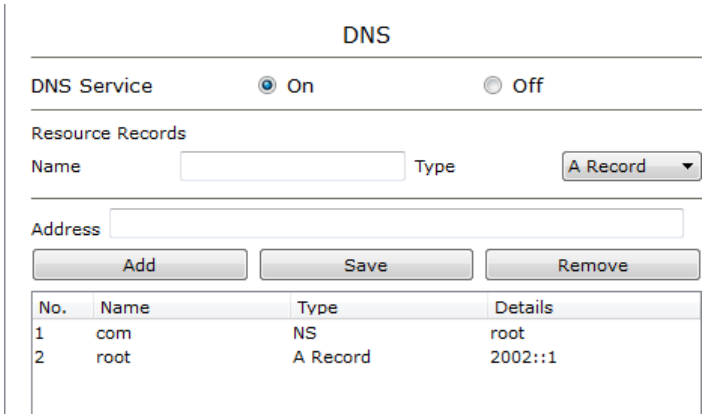
Solo que ahora se le se le asignaran las ip's correspondientes. Según sea el caso.

RED:

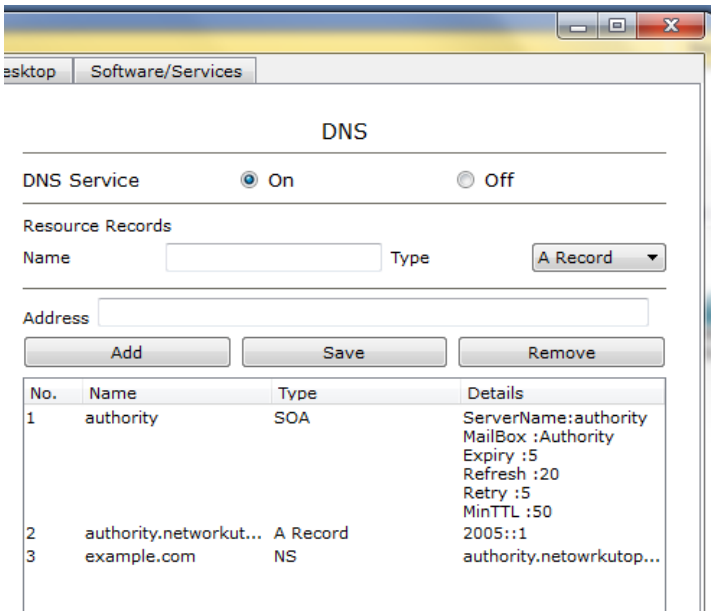
- 2000/64
- 2001/64
- 2002/64
- 2003/64
- 2004/64
- 2005/64

Y realizar las siguientes configuraciones en cada uno de los servidores. Como a continuación lo redacto.

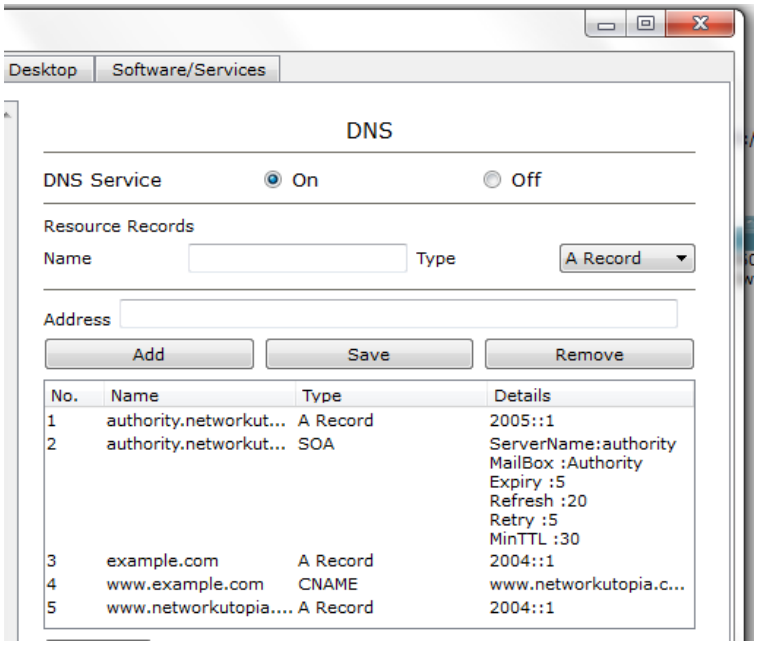
- SERVIDOR DNS LOCAL:



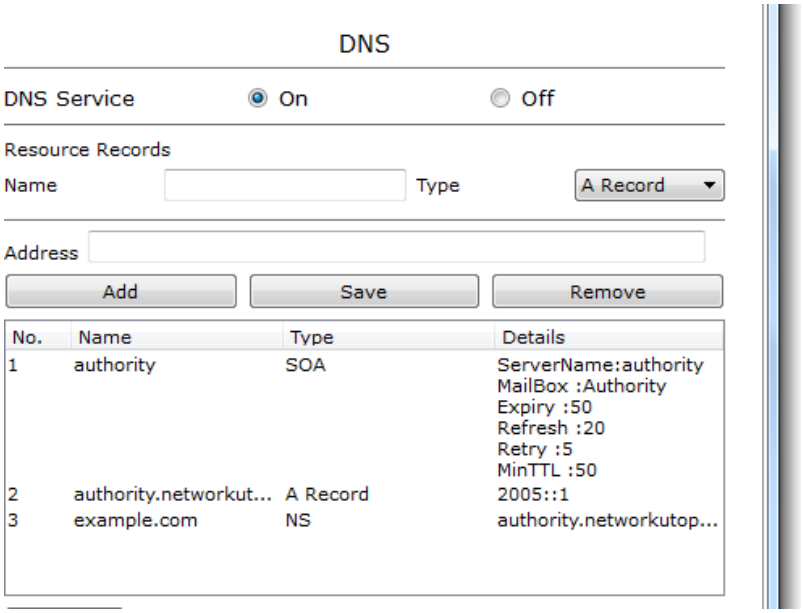
- SERVIDOR ROOT:



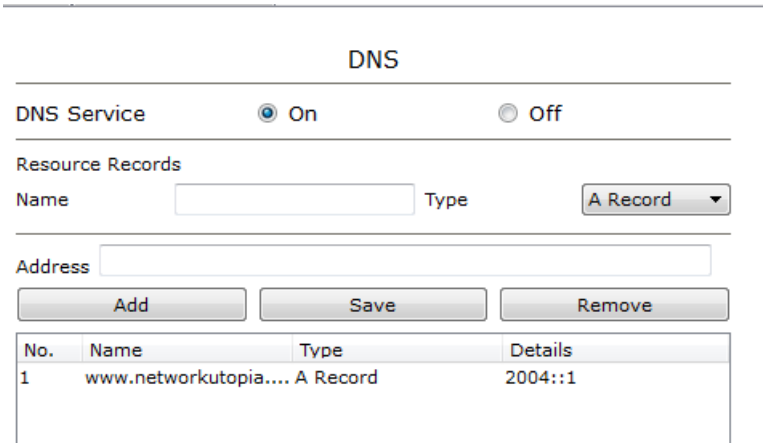
- SERVIDOR AUTHORITATIVO



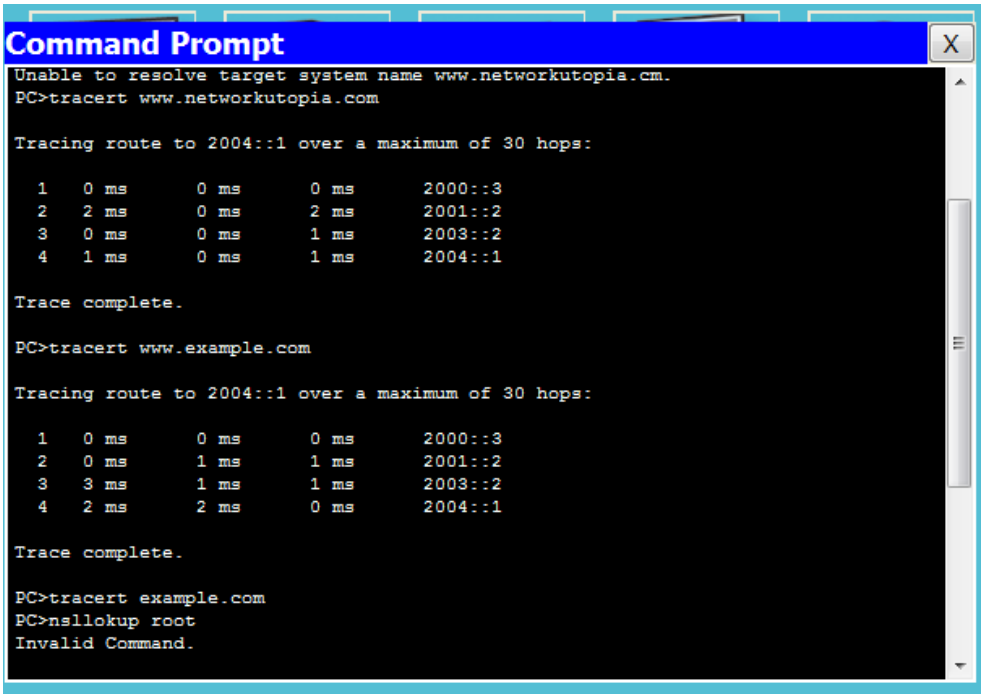
- SERVIDOR TLD:



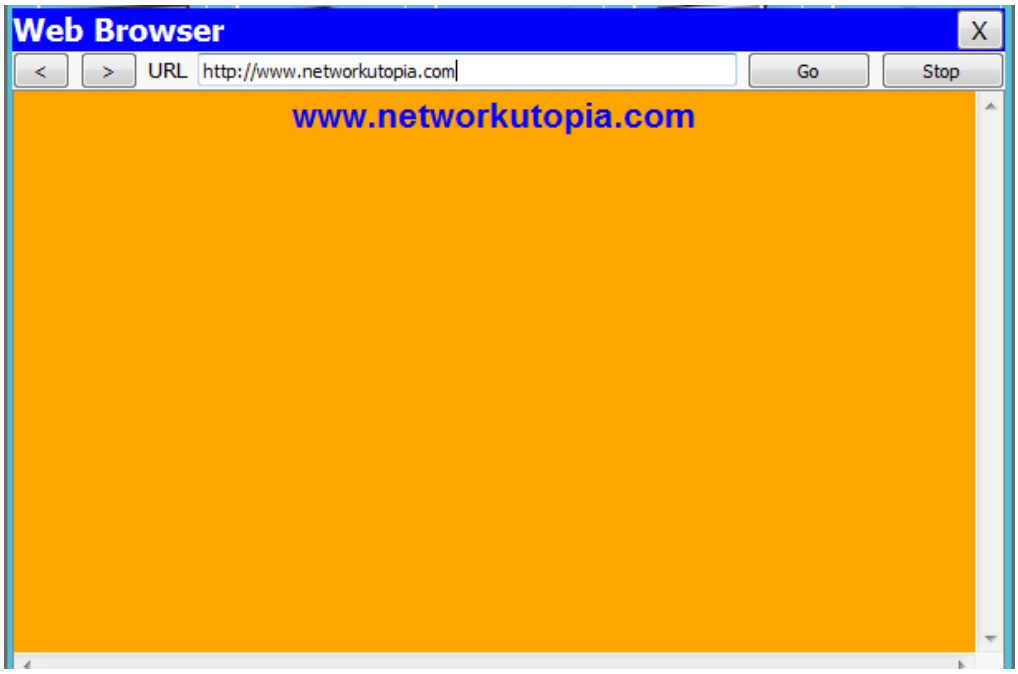
- SERVIDOR WEB: www.networkutopia.com



Una vez configurado todo, vamos a verificar que en verdad funcione. **Comando tracert**:



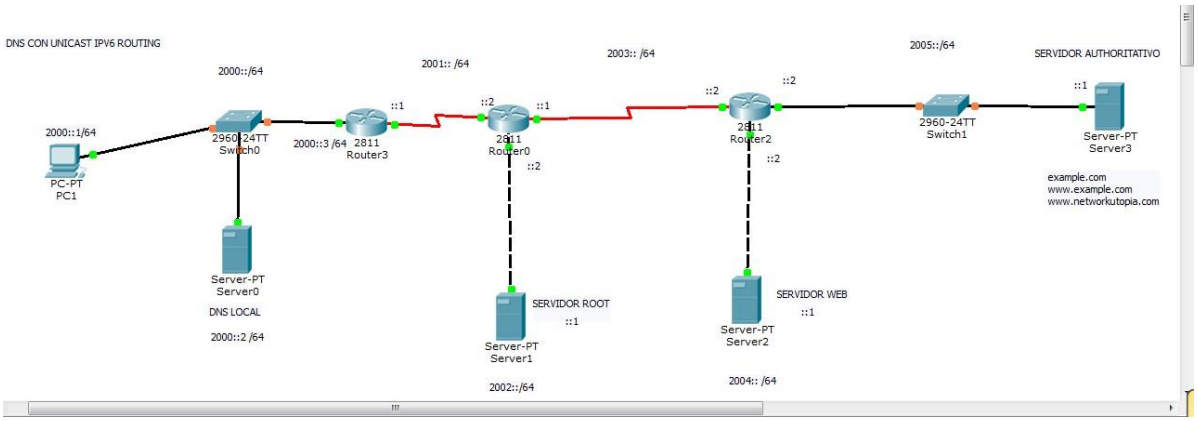
Sitio web:


Web Browser
X
<
>
URL
http://www.networkutopia.com
Go
Stop
www.networkutopia.com

PRÁCTICA 8

CONFIGURACIÓN DNS, CON ENRUTAMIENTO IPV6 – OSPF

Se pretende construir un diagrama de red, que simplifique el comportamiento de un servidor DNS, por medio de sus distintos servidores, eso lo realizara de modo de enrutamiento OSPF.



Entiéndase que la configuración tanto del:

- Servidor root
- Servidor Local
- Servidor Authoritativo.
- Servidor Web.

- Configuración del enrutamiento OSPF.

```
Router(config)#ipv6 router ospf 10
% IPv6 routing not enabled
Router(config)#ipv6 un
Router(config)#ipv6 unicast-routing
Router(config)#ipv6 router ospf 10
%OSPFv3-4-NORTRID: OSPFv3 process 10 could not pick a router-id,please configure
 manually
Router(config-rtr)#ipv6 router ospf 10
Router(config-rtr)#router-id
Router(config-rtr)#router-id 1.1.1.1
Router(config-rtr)#interf
Router(config-rtr)#interface fa0/0
Router(config-if)#ipv6 ospf 10 area 0.0.0.0
Router(config-if)#
```

- En cada uno de los router's, apuntara esta configuración que estará dada o diferenciada solo por un numero de id, general de router.
- Id 1.1.1.1
- Id 2.2.2.2
- Id 3.3.3.3

- Según sea el número router's necesarios en la red. Y ya solo se aplica el siguiente comando por interfaz necesaria:

- Fa0/0 o fa0/1 Se0/0/0 o se0/0/1

- Según sea el caso de configuración solo ira:
- Ipv6 OSPF 10 área 0.0.0.0

- Respetando el número de OSPF y el área para todos los casos.

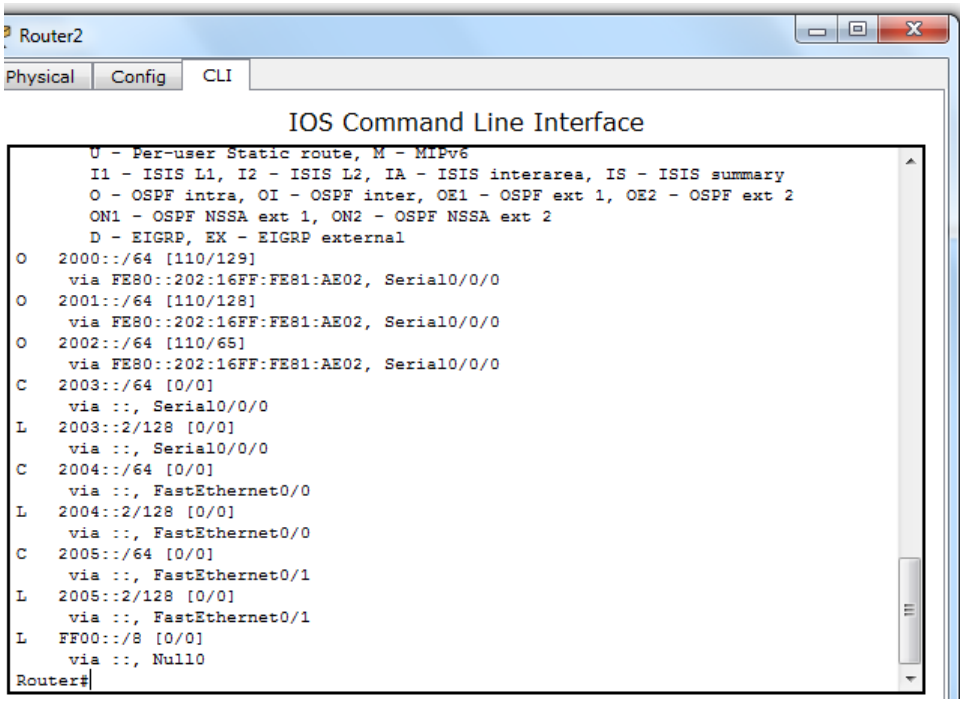
- Salidas en pantalla tablas de enrutamiento:

```
Router>enable
Router#sh ipv6 route
IPv6 Routing Table - 9 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
C   2000::/64 [0/0]
     via ::, FastEthernet0/0
L   2000::3/128 [0/0]
     via ::, FastEthernet0/0
C   2001::/64 [0/0]
     via ::, Serial0/3/0
L   2001::1/128 [0/0]
     via ::, Serial0/3/0
O   2002::/64 [110/65]
     via FE80::202:16FF:FE81:AE01, Serial0/3/0
O   2003::/64 [110/128]
     via FE80::202:16FF:FE81:AE01, Serial0/3/0
O   2004::/64 [110/129]
     via FE80::202:16FF:FE81:AE01, Serial0/3/0
O   2005::/64 [110/129]
  --More--
```

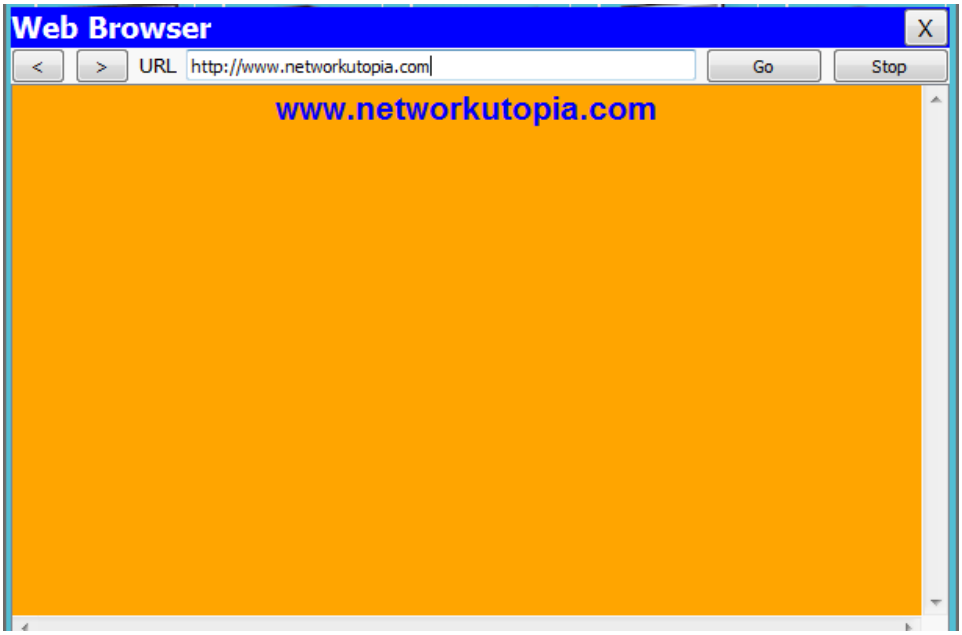
Physical | Config | CLI

IOS Command Line Interface

```
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
O   2000::/64 [110/65]
     via FE80::2E0:F9FF:FE4B:5E01, Serial0/1/0
C   2001::/64 [0/0]
     via ::, Serial0/1/0
L   2001::2/128 [0/0]
     via ::, Serial0/1/0
C   2002::/64 [0/0]
     via ::, FastEthernet0/1
L   2002::2/128 [0/0]
     via ::, FastEthernet0/1
C   2003::/64 [0/0]
     via ::, Serial0/1/1
L   2003::1/128 [0/0]
     via ::, Serial0/1/1
O   2004::/64 [110/65]
     via FE80::290:CFF:FED5:E601, Serial0/1/1
O   2005::/64 [110/65]
     via FE80::290:CFF:FED5:E601, Serial0/1/1
L   FF00::/8 [0/0]
     via ::, Null0
Router#
```


Router2
Physical
Config
CLI
IOS Command Line Interface
U - Per-user Static route, M - MIPv6
I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
D - EIGRP, EX - EIGRP external
O 2000::/64 [110/129]
via FE80::202:16FF:FE81:AE02, Serial0/0/0
O 2001::/64 [110/128]
via FE80::202:16FF:FE81:AE02, Serial0/0/0
O 2002::/64 [110/65]
via FE80::202:16FF:FE81:AE02, Serial0/0/0
C 2003::/64 [0/0]
via ::, Serial0/0/0
L 2003::2/128 [0/0]
via ::, Serial0/0/0
C 2004::/64 [0/0]
via ::, FastEthernet0/0
L 2004::2/128 [0/0]
via ::, FastEthernet0/0
C 2005::/64 [0/0]
via ::, FastEthernet0/1
L 2005::2/128 [0/0]
via ::, FastEthernet0/1
L FF00::/8 [0/0]
via ::, Null0
Router#

- Web:

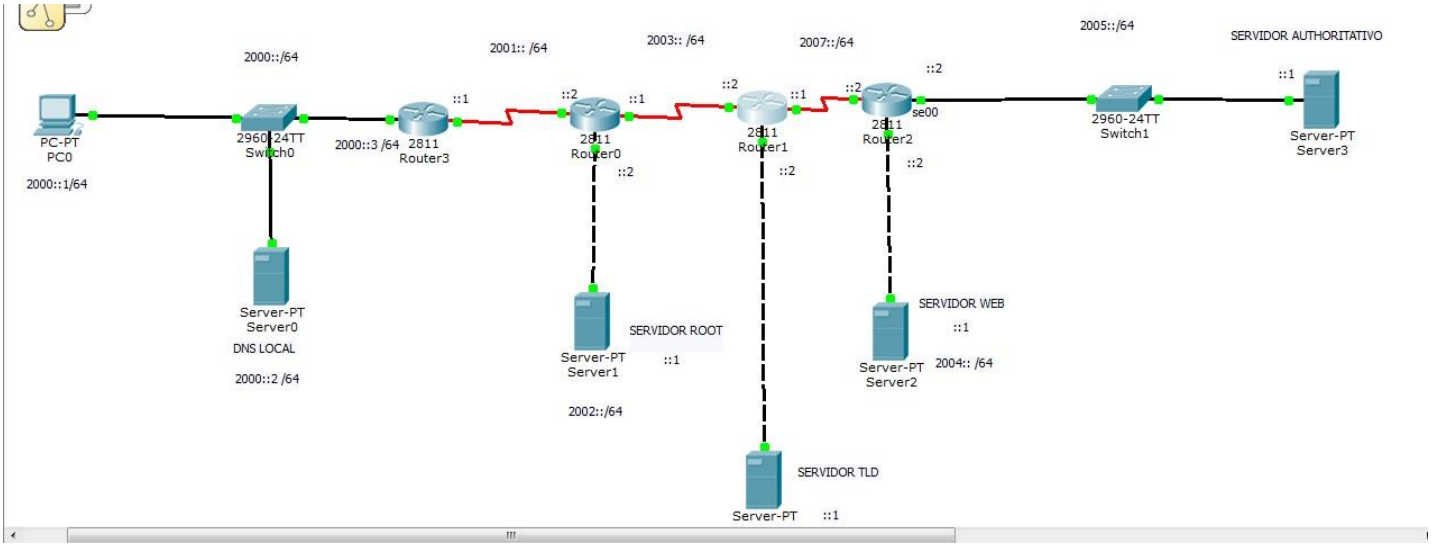

Web Browser
X
<
>
URL
http://www.networkutopia.com
Go
Stop
www.networkutopia.com

PRÁCTICA 9
CONFIGURACIÓN DNS, CON ENRUTAMIENTO IPV6 – EIGRP

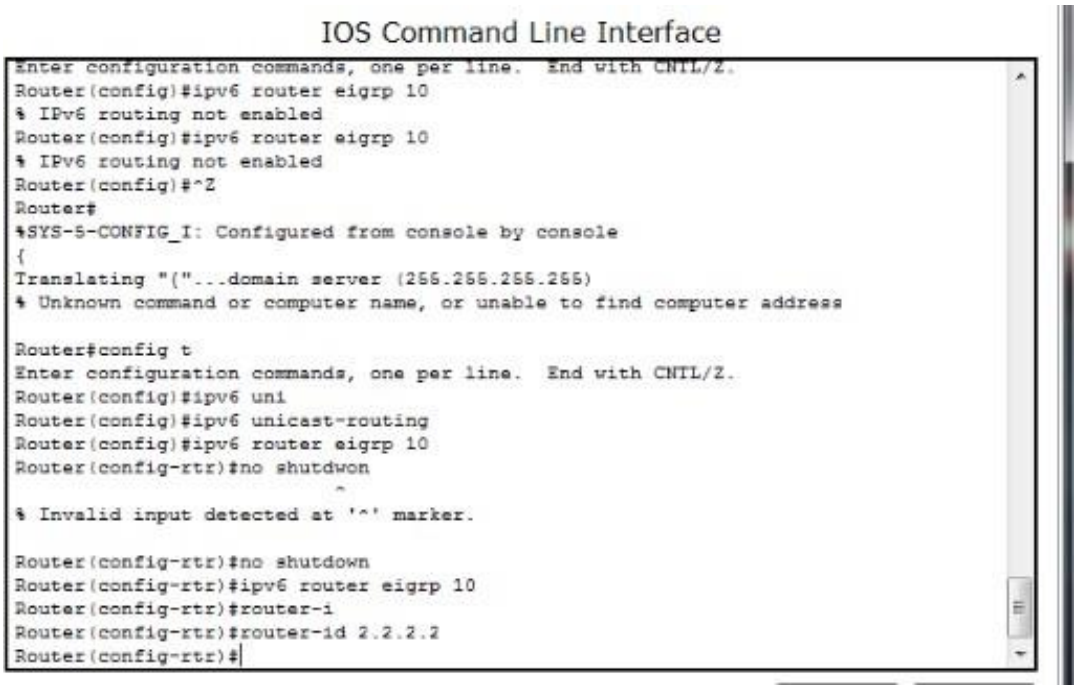
Se pretende construir un diagrama de red, que simplifique el comportamiento de un servidor DNS, por medio de sus distintos servidores, eso lo realizara de modo de enrutamiento EIGRP.

Entiéndase que la configuración tanto del:

- Servidor root
- Servidor Local
- Servidor TLD
- Servidor Authoritativo.
- Servidor Web.



Configurando EIGRP.



Posteriormente se aplica solo por interfaz:

- FA0/0
- SE0/0/

Según sea el caso.

```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ipv6 uni
Router(config)#ipv6 unicast-routing
Router(config)#ipv6 router eigrp 10
Router(config-rtr)#no shutdwon
                   ^
% Invalid input detected at '^' marker.

Router(config-rtr)#no shutdown
Router(config-rtr)#ipv6 router eigrp 10
Router(config-rtr)#router-i
Router(config-rtr)#router-id 2.2.2.2
```

De igual manera estas líneas se configuran de manera general fuera del router cambiando solo el Id según sea el caso:

1.1.1.1
3.3.3.3
4.4.4.4
2.2.2.2

Y en cada una de la interfaz que se conectan al router, se va a configurar:

ipv6 eigrp 10

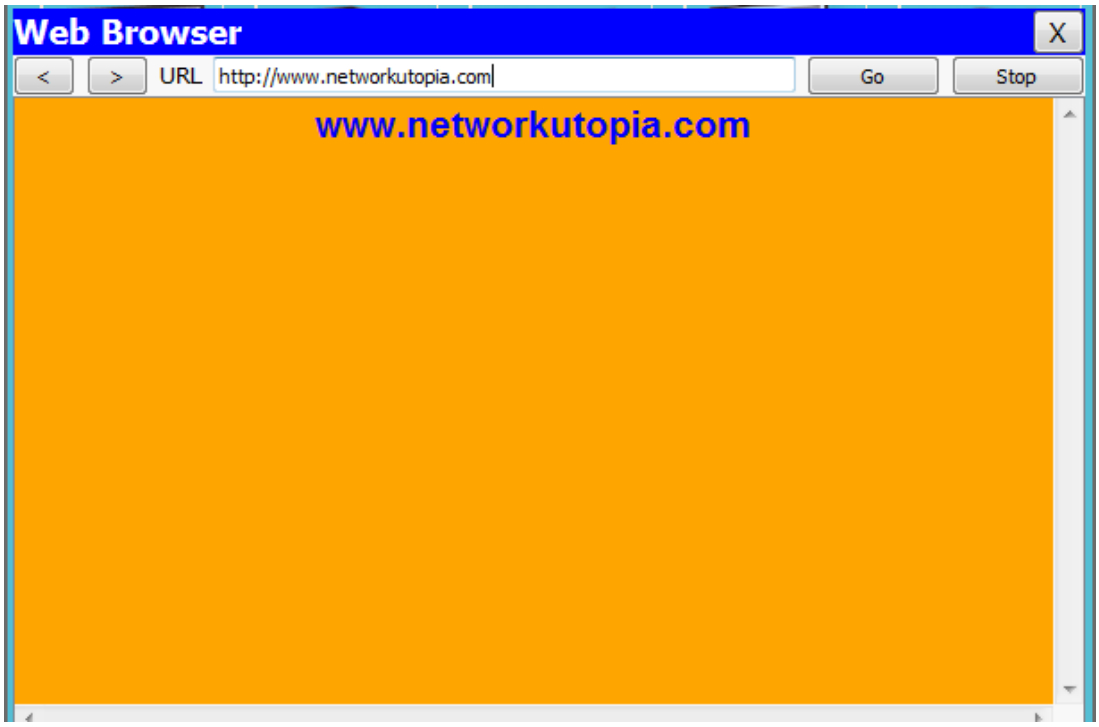
Salidas en pantalla tablas de enrutamiento:

```
Router>enable
Router#sh ipv6 route
IPv6 Routing Table - 11 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
C   2000::/64 [0/0]
     via ::, FastEthernet0/0
L   2000::3/128 [0/0]
     via ::, FastEthernet0/0
C   2001::/64 [0/0]
     via ::, Serial0/3/0
L   2001::1/128 [0/0]
     via ::, Serial0/3/0
D   2002::/64 [90/2172416]
     via FE80::202:16FF:FE81:AE01, Serial0/3/0
D   2003::/64 [90/2681856]
     via FE80::202:16FF:FE81:AE01, Serial0/3/0
D   2004::/64 [90/3196416]
     via FE80::202:16FF:FE81:AE01, Serial0/3/0
D   2005::/64 [90/3196416]
 --More--
```

```
       D - EIGRP, EX - EIGRP external
D   2000::/64 [90/2684416]
     via FE80::202:16FF:FE81:AE02, Serial0/0/0
D   2001::/64 [90/2681856]
     via FE80::202:16FF:FE81:AE02, Serial0/0/0
D   2002::/64 [90/2172416]
     via FE80::202:16FF:FE81:AE02, Serial0/0/0
C   2003::/64 [0/0]
     via ::, Serial0/0/0
L   2003::2/128 [0/0]
     via ::, Serial0/0/0
D   2004::/64 [90/2172416]
     via FE80::290:CFF:FED5:E601, Serial0/1/0
D   2005::/64 [90/2172416]
     via FE80::290:CFF:FED5:E601, Serial0/1/0
C   2007::/64 [0/0]
     via ::, Serial0/1/0
L   2007::1/128 [0/0]
     via ::, Serial0/1/0
C   2008::/64 [0/0]
     via ::, FastEthernet0/0
L   2008::2/128 [0/0]
     via ::, FastEthernet0/0
L   FF00::/8 [0/0]
     via ::, Null0
Router#
```

```
Router>enable
Router#sh ipv6 route
IPv6 Routing Table - 12 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
D   2000::/64 [90/3196416]
     via FE80::205:5EFF:FE14:501, Serial0/0/0
D   2001::/64 [90/3193856]
     via FE80::205:5EFF:FE14:501, Serial0/0/0
D   2002::/64 [90/2684416]
     via FE80::205:5EFF:FE14:501, Serial0/0/0
D   2003::/64 [90/2681856]
     via FE80::205:5EFF:FE14:501, Serial0/0/0
C   2004::/64 [0/0]
     via ::, FastEthernet0/0
L   2004::2/128 [0/0]
     via ::, FastEthernet0/0
C   2005::/64 [0/0]
     via ::, FastEthernet0/1
L   2005::2/128 [0/0]
 --More--
```

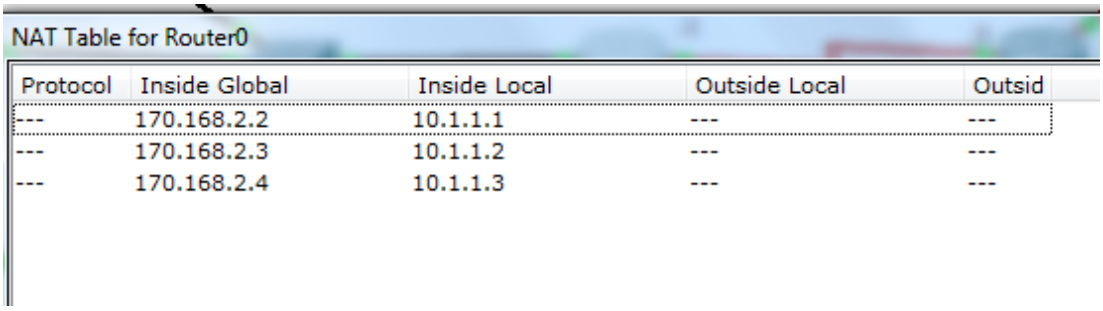
Visualización Web:



PRÁCTICA 10
NAT – ESTATICO

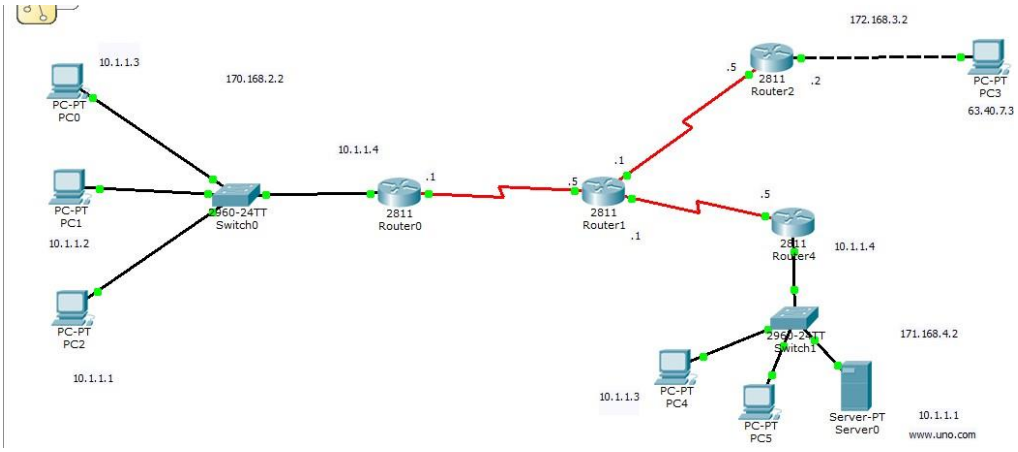
NAT: Es un protocolo que permite la simulación de traducción de comunicación, entre distintas redes de diferentes segmentos, brindando con esto una comunicación global con distintos host alojados bajo cualquier isp.

NAT ESTATICO: Se define la tabla de nat, manualmente:


NAT Table for Router0

Protocol	Inside Global	Inside Local	Outside Local	Outsid
---	170.168.2.2	10.1.1.1	---	---
---	170.168.2.3	10.1.1.2	---	---
---	170.168.2.4	10.1.1.3	---	---

- Construir el siguiente diagrama:



Nota: Nótese que la configuración de red es distintas en algunos casos, para ser específicos para el host, mientras que las otras PC´S, están firmadas bajo la misma red, pero nateadas, en distintas redes.

En NAT existen dos mecanismos de distingo estos son:

Outside.
Inside.

Inside: Nos va a proveer la posibilidad de configurar todo el entorno inmerso en la red.

Outside: Sera la capacidad de NAT, para poder comunicarse bajo distintas redes. Con una red única de traducción.

La configuración para cada router es la siguiente:

ROUTER 0:

```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip nat inside source 10.1.1.1 170.168.2.2
                                    ^
% Invalid input detected at '^' marker.

Router(config)#ip nat inside source static 10.1.1.1 171.168.4.2
Router(config)#ip nat inside source static 10.1.1.2 171.168.4.3
Router(config)#ip nat inside source static 10.1.1.3 171.168.4.4
Router(config)#interface fa0/0
Router(config-if)#ip nat inside
Router(config-if)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#interface se0/3/0
                ^
% Invalid input detected at '^' marker.

Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface se0/3/0
Router(config-if)#ip nat outside
Router(config-if)#
```

ROUTER 2:

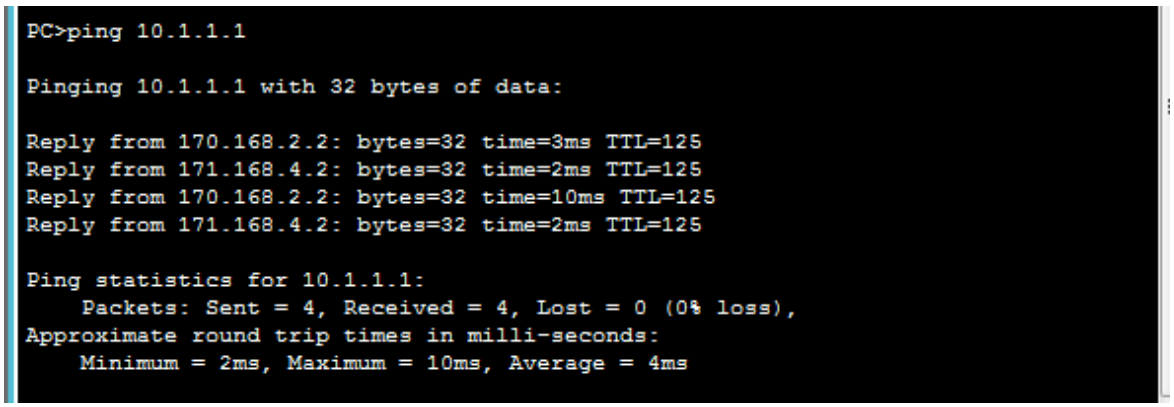
```
Router#
Router#
Router#ip nat inside source static 63.40.7.3 172.168.3.2
          ^
% Invalid input detected at '^' marker.

Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip nat inside source static 63.40.7.3 172.168.3.2
Router(config)#interface fa0/0
Router(config-if)#ip nat inside
Router(config-if)#interface se0/2/0
Router(config-if)#ip nat outside
Router(config-if)#
```

Copy Pa

ROUTER 4:

```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 10.1.1.0
Router(config-router)#network 170.168.2.0
Router(config-router)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip nat inside source static 10.1.1.1 170.168.2.2
Router(config)#ip nat inside source static 10.1.1.2 170.168.2.3
Router(config)#ip nat inside source static 10.1.1.3 170.168.2.4
Router(config)#interface fa0/0
Router(config-if)#ip nat inside
Router(config-if)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface se0/3/0
Router(config-if)#ip nat outside
Router(config-if)#
```

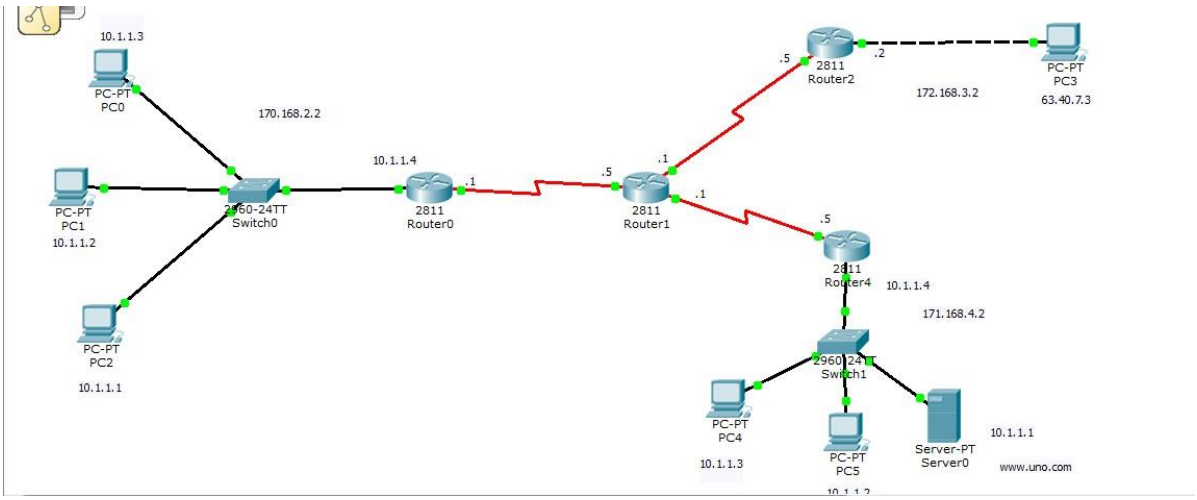
Se llega desde el host a las IP'S que se parecen en común y aquí se verá si NAT está bien: Pero cada una desde su respectiva IP NAT.



PRÁCTICA 11
NAT DINÁMICO

NAT DINAMICO: En esta modalidad de protocolo lo que se realiza es asignar un rango de IP'S llamados POOL'S que manejan un rango de IP'S que estas se asignaran de manera dinámica a todos los host firmados bajo este protocolo.

Construir el siguiente diagrama:



Se va configurar lo siguiente en los respectivos router's.

R0:

```
 ip address 10.1.1.4 255.0.0.0
 ip nat inside
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/3/0
 ip address 170.168.2.1 255.255.0.0
 ip nat outside
 clock rate 56000
!
```

```
interface Serial0/3/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 10.0.0.0
 network 170.168.0.0
!
ip nat pool r0 170.168.2.2 170.168.2.254 netmask 255.255.0.0
ip nat inside source list 1 pool r0
ip classless
!
!
access-list 1 permit 10.1.1.0 0.0.0.255
access-list 1 permit 63.40.7.0 0.0.0.255
!
no cdp run
!
!
```

```
interface Serial0/0/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/2/0
 ip address 172.168.3.5 255.255.0.0
 ip nat outside
!
interface Serial0/2/1
 --More--
```

```
!
interface Serial0/2/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 63.0.0.0
 network 172.168.0.0
!
ip nat pool r2 172.168.3.2 172.168.3.254 netmask 255.255.0.0
ip nat inside source list 1 pool r2
ip classless
!
!
!
no cdp run
!
!
!
!
```

R4:

```
interface Serial0/2/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/2/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/3/0
 ip address 171.168.4.5 255.255.0.0
 ip nat outside
!
interface Serial0/3/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 --More--
```

```
router rip
 version 2
 network 10.0.0.0
 network 171.168.0.0
!
ip nat pool r4 171.168.4.2 171.168.4.254 netmask 255.255.0.0
ip nat inside source list 1 pool r4
ip classless
!
!
access-list 1 permit 10.1.1.0 0.0.0.255
!
no cdp run
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
 login
!
!
```

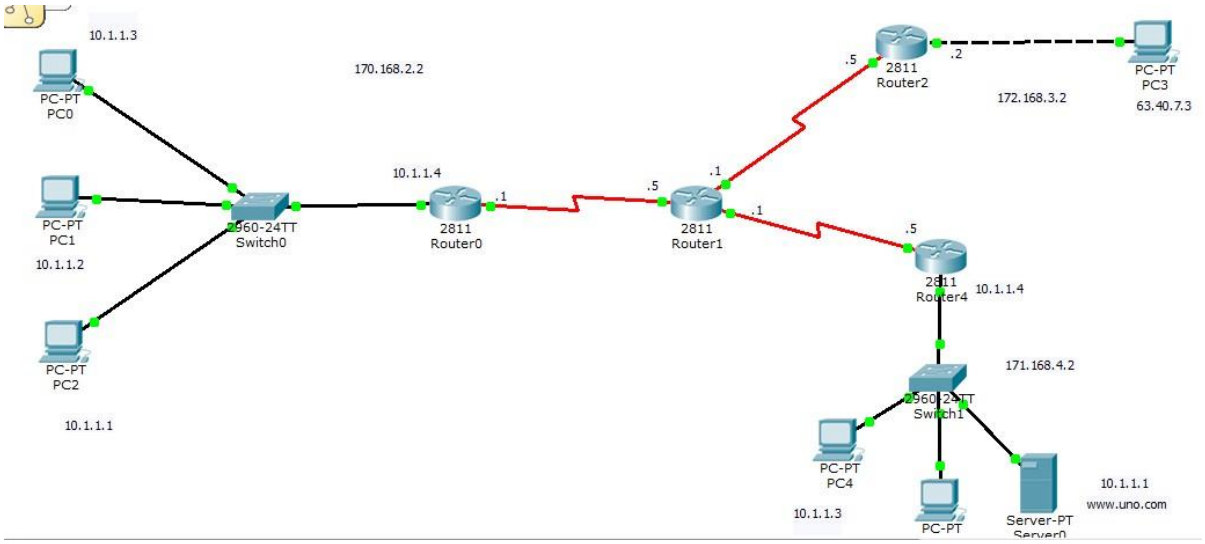
Se llega desde el host a las IP'S que se parecen en común y aquí se verá si NAT está bien: Pero cada una desde su respectiva IP-NAT

```
Reply from 171.168.4.2: bytes=32 time=3ms TTL=125
Reply from 170.168.2.2: bytes=32 time=4ms TTL=125
Reply from 171.168.4.2: bytes=32 time=2ms TTL=125
Reply from 170.168.2.2: bytes=32 time=2ms TTL=125

Ping statistics for 10.1.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 4ms, Average = 2ms
```

PRÁCTICA 12
NAT OVERLOAD

NAT OVERLOAD: A diferencia de los otras modalidades el NAT sobrecargado, lo que va realizar es asignar una prioridad para que todos los host que están me modo INSIDE, salgan y se comuniquen por una solo IP'S de una interfaz en modo OUTSIDE.

- Construir el siguiente modelo:



Configuración asociada a cada router:

R0:

```
!
interface Serial0/0/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/3/0
 ip address 170.168.2.1 255.255.0.0
 ip nat outside
 clock rate 56000
!
interface Serial0/3/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router rip
```

```
!
router rip
 version 2
 network 10.0.0.0
 network 170.168.0.0
!
ip nat pool r0 170.168.2.1 170.168.2.1 netmask 255.255.0.0
ip nat inside source list 1 pool r0 overload
ip classless
!
!
access-list 1 permit 10.1.1.0 0.0.0.255
access-list 1 permit 63.40.7.0 0.0.0.255
!
no cdp run
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
 login
```

R3:

```
interface FastEthernet0/0
 ip address 63.40.7.2 255.0.0.0
 ip nat inside
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 63.0.0.0
 network 172.168.0.0
!
ip nat pool r2 172.168.3.5 172.168.3.5 netmask 255.255.0.0
ip nat inside source list 1 pool r2 overload
ip classless
!
!
!
```

R4:

```
interface FastEthernet0/0
 ip address 10.1.1.4 255.0.0.0
 ip nat inside
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/2/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/2/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/3/0
 ip address 171.168.4.5 255.255.0.0
 ip nat outside
```

```
!
interface Serial0/3/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 10.0.0.0
 network 171.168.0.0
!
ip nat pool r4 171.168.4.5 171.168.4.5 netmask 255.255.0.0
ip nat inside source list 1 pool r4 overload
ip classless
!
!
access-list 1 permit 10.1.1.0 0.0.0.255
access-list 1 permit 63.40.7.0 0.0.0.255
!
no cdp run
!
!
```

Se llega desde el host a las IP'S que se parecen en común y aquí se verá si NAT está bien: Pero cada una desde su respectiva IP NAT.

```
Pinging 10.1.1.1 with 32 bytes of data:

Reply from 171.168.4.5: bytes=32 time=3ms TTL=125
Reply from 170.168.2.1: bytes=32 time=2ms TTL=125
Reply from 171.168.4.5: bytes=32 time=2ms TTL=125
Reply from 170.168.2.1: bytes=32 time=2ms TTL=125

Ping statistics for 10.1.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms
```

Nótese que esta ocasión todo el flujo de respuesta apunta a la interfaz del router que está en modo OUTSIDE.