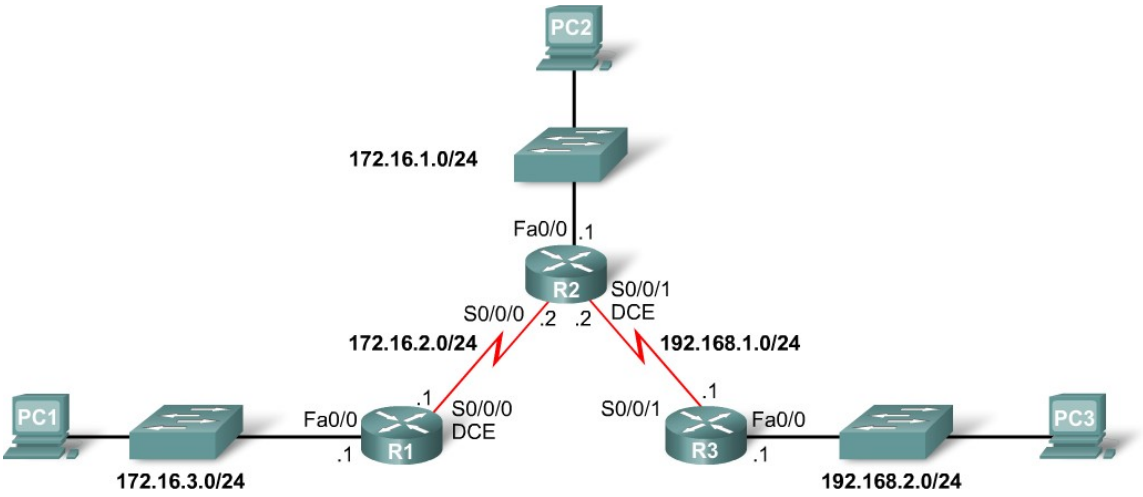
1. Utilitza el Packet Tracer per construir la xarxa que us especifica el següent Diagrama de Topologia. Utilitza els routers 1841 i configura'ls per tal que tinguin 2 ports serial.



2. Crea la Taula d'Adreçament corresponent a aquest Diagrama de Topologia.

	Nom del Dispositiu	Interfície (IP + MX)	Gateway
Xarxa 1 (LAN1) 172.16.3.0/24	PC1	FastEthernet 0: 172.16.3.2/24 255.255.255.0	172.16.3.1
	Router1	FastEthernet 0/0: 172.16.3.1/24 255.255.255.0	Es la Gateway
Xarxa 2 (LAN2) 172.16.1.0/24	PC2	FastEthernet 0: 172.16.1.2/24 255.255.255.0	172.16.1.1
	Router2	FastEthernet 0/0: 172.16.1.1/24 255.255.255.0	Es la Gateway
Xarxa 3 (LAN3) 192.168.2.0/24	PC3	FastEthernet 0: 192.168.2.0/24 255.255.255.0	192.168.2.1
	Router3	FastEthernet 0/0: 192.168.2.1/24 255.255.255.0	Es la Gateway
Xarxa 4	Router1	Serial 0/0/0:	172.16.2.2 (Next

(WAN1) 172.16.2.0/24		172.16.2.1/24 255.255.255.0	hop)
	Router2	Serial 0/0/0: 172.16.2.2/24 255.255.255.0	172.16.2.1 (Next hop)
Xarxa 5 (WAN2) 192.168.1.0/24	Router3	Serial 0/0/0: 172.16.1.1/24 255.255.255.0	172.16.1.2 (Next hop)
	Router2	Serial 0/0/0: 172.16.1.2/24 255.255.255.0	172.16.1.1 (Next hop)

3. Configureu, per CLI (línia de comandes)

- Les adreces IP dels routers

ROUTER2 FAST ETHERNET 0/0

Router>enable

Router#config terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#interface fa

Router(config)#interface fastEthernet 0/0

Router(config-if)#ip address 172.16.1.1 255.255.255.0

Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

ROUTER1 FAST ETHERNET 0/0

```
Router>enable

Router#config ter

Router#config terminal

Enter configuration commands, one per line.  End with CNTL/Z.

Router(config)#interface fa

Router(config)#interface fastEthernet 0/0

Router(config)#interface fastEthernet 0/0

Router(config-if)#ip address 172.16.3.1 255.255.255.0

Router(config-if)#no shutdown



Router(config-if)#

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up



%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
```

ROUTER3 FAST ETHERNET 0/0

```
Router>enable

Router#config

Router#configure ter

Router#configure terminal

Enter configuration commands, one per line.  End with CNTL/Z.

Router(config)#inter

Router(config)#interface F
```

```
Router(config)#interface FastEthernet 0

Router(config)#interface FastEthernet 0/0

Router(config)#interface FastEthernet 0/0

Router(config-if)#ip add

Router(config-if)#ip address 17

Router(config-if)#ip address 172

Router(config-if)#ip address 192.168.2.1 255.255.255.0

Router(config-if)#no shutdown


Router(config-if)#

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up


%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
```

ROUTER2 SERIAL 0/0/0

```
Router>enable

Router#confi

Router#configure ter

Router#configure terminal

Enter configuration commands, one per line.  End with CNTL/Z.

Router(config)#inter

Router(config)#interface se

Router(config)#interface serial 0
```

```
Router(config)#interface serial 0/0/0

Router(config-if)#ip addre

Router(config-if)#ip address 172.18.2.2 255.255.255.0

Router(config-if)#no shutdown


%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down

Router(config-if)#
```

ROUTER2 SERIAL 0/0/1

```
Router(config-if)#exit

Router(config)#inter

Router(config)#interface S

Router(config)#interface Serial 0/0/1

Router(config-if)#ip address 192.168.1.2 255.255.255.0

Router(config-if)#clock rate 56000

Router(config-if)#no shutdown


%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
```

ROUTER1 SERIAL 0/0/0

```
Router#confi

Router#configure ter

Router#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#fas

Router(config)#fast Eth

Router(config)#inter

Router(config)#interface Se

Router(config)#interface Serial 0/0/0

Router(config-if)#ip address 172.18.2.1 255.255.255.0

Router(config-if)#clock rate 56000

Router(config-if)#no shutdown

Router(config-if)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

Router(config-if)#

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed

ROUTER3 SERIAL 0/0/0

Router>enable

Router#confi

Router#configure ter

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#inter

Router(config)#interface Se

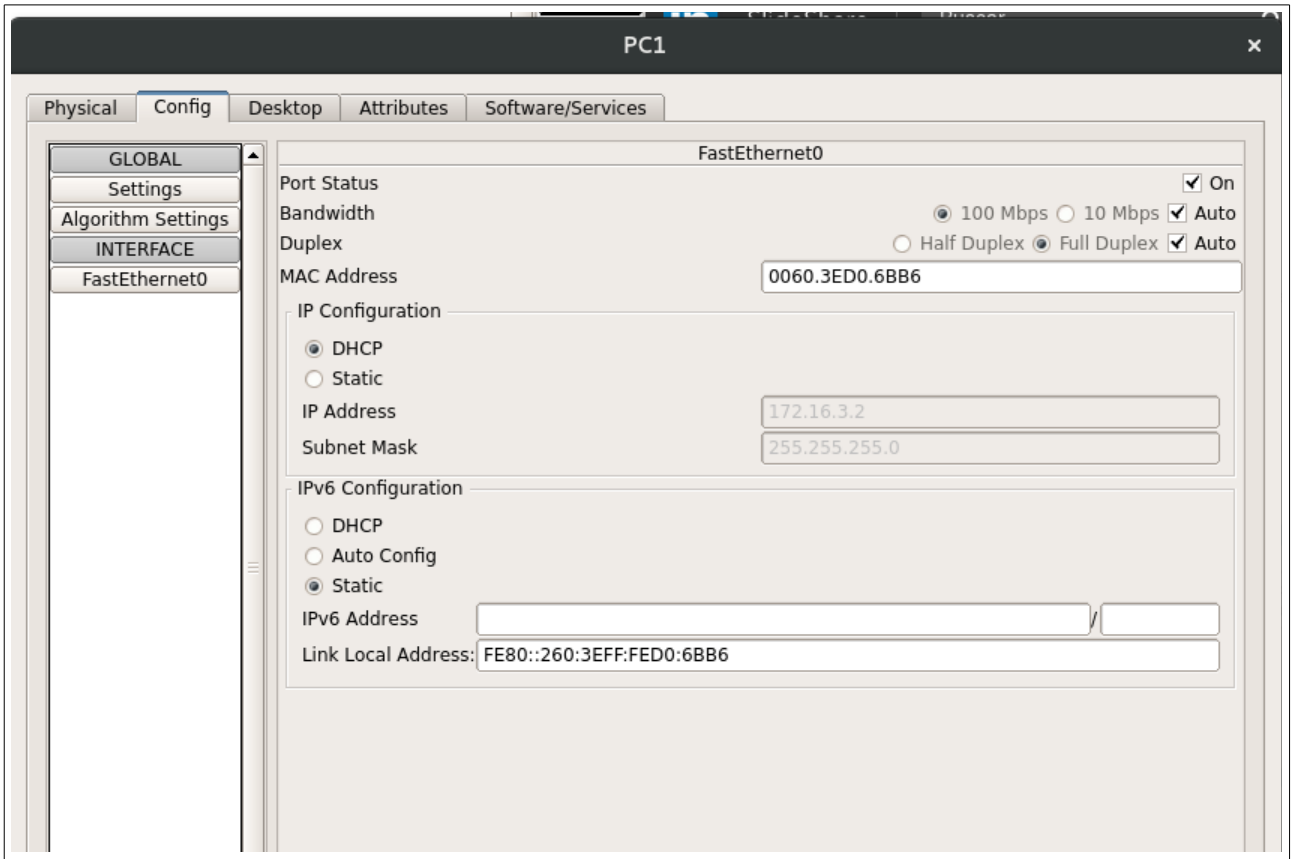
```
Router(config)#interface Serial 0/0/0

Router(config-if)#ip address

Router(config-if)#ip address 192.168.1.1 255.255.255.0

Router(config-if)#no shutdown



Router(config-if)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
```

- Les adreces dels PCs, mitjançant DHCP
  https://www.cisco.com/c/en/us/td/docs/ios/12_2/ip/configuration/guide/fipr_c/1cfdhcp.html

ROUTER1

```
Router(config)#service dhcp

Router(config)#ip dhcp pool POOL1

Router(dhcp-config)#network 172.16.3.0 255.255.255.0

Router(dhcp-config)#default-router 172.16.3.1

Router(dhcp-config)#ip dhcp excluded-address 172.16.3.1

Router(dhcp-config)#exit

Router(config)#
```

PC1



C:\>ipconfig

FastEthernet0 Connection:(default port)

Link-local IPv6 Address.....: FE80::260:3EFF:FED0:6BB6

IP Address.....: 172.16.3.2

Subnet Mask.....: 255.255.255.0

Default Gateway.....: 172.16.3.1

C:\>

ROUTER2

Router>enable

Router#config

Router#configure ter

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#service dhcp

Router(config)#ip dhcp pool POOL1

Router(dhcp-config)#network 172.16.1.0 255.255.255.0

Router(dhcp-config)#default-router 172.16.1.1

Router(dhcp-config)#ip dhcp excluded-address 172.16.1.1

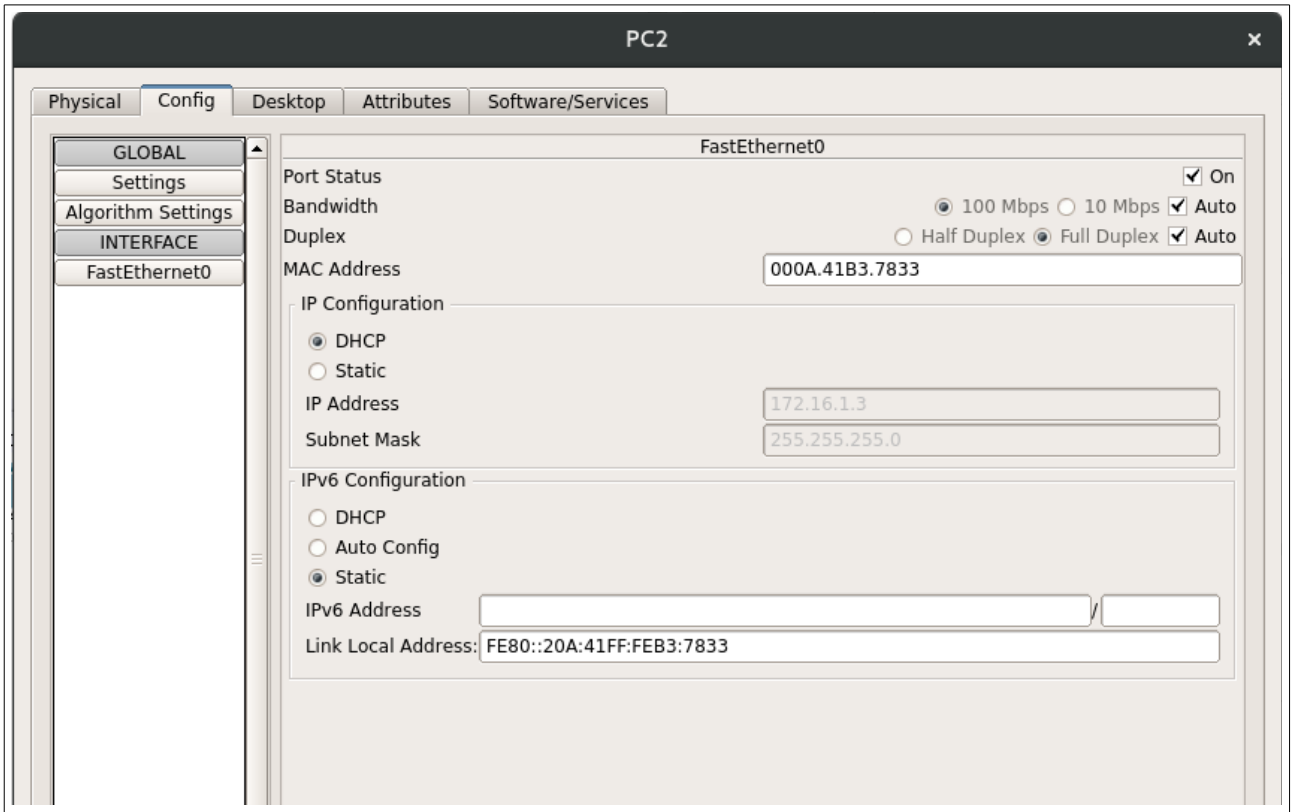
Router(config)#exit

Router#

%SYS-5-CONFIG_I: Configured from console by console

Router#

PC2



C:\>ipconfig

FastEthernet0 Connection:(default port)

Link-local IPv6 Address.....: FE80::20A:41FF:FEB3:7833

IP Address.....: 172.16.1.3

Subnet Mask.....: 255.255.255.0

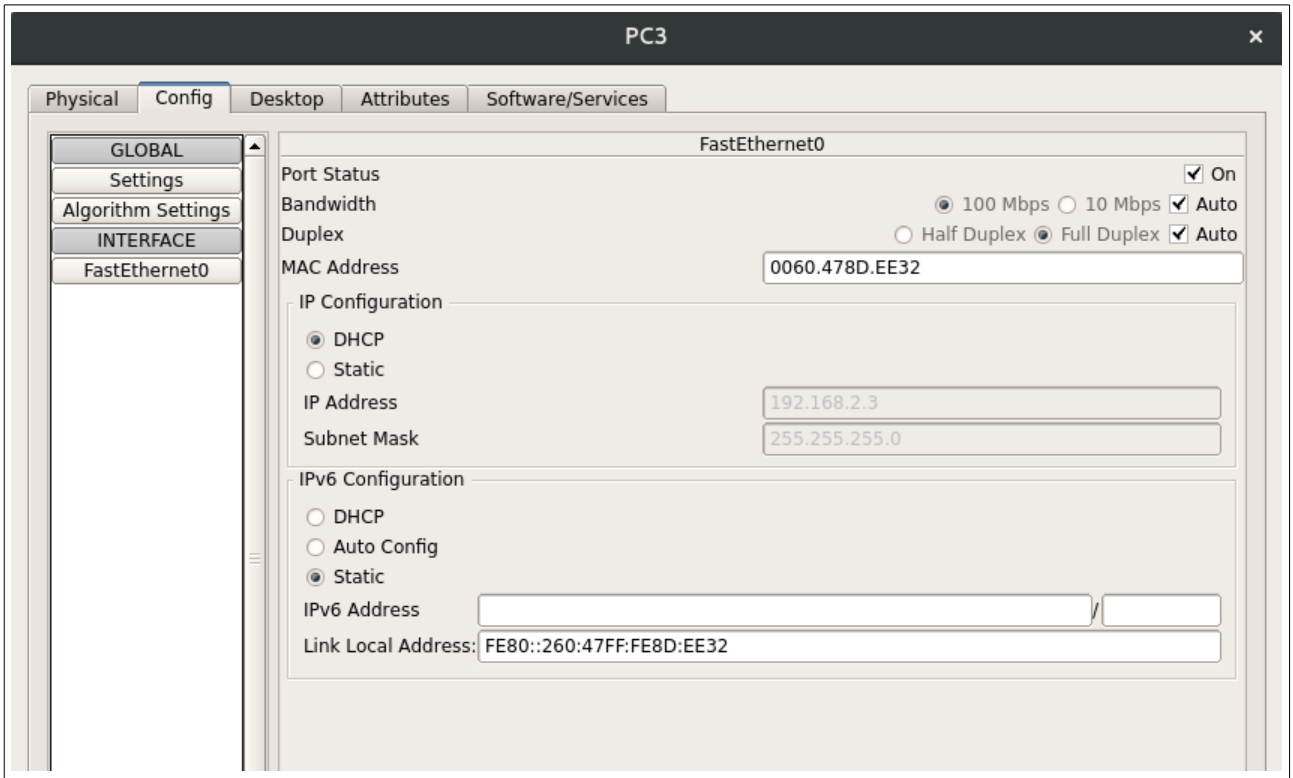
Default Gateway.....: 172.16.1.1

C:\>

ROUTER3

```
Router>enable

Router#config

Router#configure ter

Router#configure terminal

Enter configuration commands, one per line.  End with CNTL/Z.

Router(config)#service dhcp

Router(config)#ip dhcp pool POOL1

Router(dhcp-config)#network 192.168.2.0 255.255.255.0

Router(dhcp-config)#default-router 192.168.2.1

Router(dhcp-config)#ip dhcp excluded-address 192.168.2.1

Router(config)#exit

Router#

%SYS-5-CONFIG_I: Configured from console by console



Router#
```

PC3



C:\>ipconfig

FastEthernet0 Connection:(default port)

Link-local IPv6 Address.....: FE80::260:47FF:FE8D:EE32

IP Address.....: 192.168.2.3

Subnet Mask.....: 255.255.255.0

Default Gateway.....: 192.168.2.1

C:\>

4. Copia la configuració del running-config a l'startup-config. No t'oblidis d'anar fent aquest pas a mesura que avances en l'exercici.

ROUTER1

Router>enable

Router#copy running-c

Router#copy running-config star

Router#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

Router#

ROUTER2

Router>enable

Router#copy ru

Router#copy running-config sta

Router#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

Router#

ROUTER3

Router>enable

Router#copy ru

```
Router#copy running-config star

Router#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

Router#
```

5. Visualitza les taules d'enrutament de cada router i comprova que contenen les xarxes connectades directament a cadascun d'ells. Quina comanda utilitzes per veure la taula d'enrutament d'un router? Inclou el resultat.

ROUTER1

```
Router#show 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


    172.16.0.0/24 is subnetted, 1 subnets
```

C 172.16.3.0 is directly connected, FastEthernet0/0

172.18.0.0/24 is subnetted, 1 subnets

C 172.18.2.0 is directly connected, Serial0/0/0

ROUTER2

Router>enable

Router#show 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

172.16.0.0/24 is subnetted, 1 subnets

C 172.16.1.0 is directly connected, FastEthernet0/0

172.18.0.0/24 is subnetted, 1 subnets

C 172.18.2.0 is directly connected, Serial0/0/0

C 192.168.1.0/24 is directly connected, Serial0/0/1

ROUTER3

```
Router>enable

Router#show 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


C    192.168.1.0/24 is directly connected, Serial0/0/0

C    192.168.2.0/24 is directly connected, FastEthernet0/0
```

6. Quin grup de comandes has hagut d'executar per configurar la interfície Fa0/0 del Router R1? Indica també, el «mode» en el que s'ha de trobar el router per tal d'executar cadascuna de les comandes (per exemple: R1#).

- **Enable**
- **configure terminal**
- **interface Fast[TAB] 0/0**
- **Mode enable per a poder configurar amb permisos privilegiats el Router (R1#). I seguidament en mode «configure terminal».**

7. Quin grup de comandes has hagut d'executar per configurar el servei DHCP del Router R1 per a la Xarxa 1 (LAN1)? Indica també, el «mode» en el que s'ha de trobar el router per tal d'executar cadascuna de les comandes (per exemple: R1#).

ROUTER1

Router(config)#service dhcp

Router(config)#ip dhcp pool POOL1

Router(dhcp-config)#network 172.16.3.0 255.255.255.0

Router(dhcp-config)#default-router 172.16.3.1

Router(dhcp-config)#ip dhcp excluded-address 172.16.3.1

Router(dhcp-config)#exit

Router(config)#

Está en mode enable, configure terminal i després obrim el servei de DHCP del Router1. Després entra en mode configuració de DHCP-config.

8. Activa el «debug» de la taula d'enrutament per als tres routers. És a dir, activa el servei que t'avisa de qualsevol canvi que es produeixi en la taula d'enrutament. Aquest servei s'activa mitjançant la comanda *Router#debug ip Routing*

Router>enable

Router#debug ip routing

IP routing debugging is on

HO FEM ALS 3 ROUTERS

9. Acaba de configurar les taules d'enrutament dels tres routers mitjançant «enrutament estàtic: next-hop» (només rutes per a les LAN). Indica quina comanda has d'executar al router R1 per tal de configurar la ruta estàtica a la xarxa 192.168.2.0/24.

ROUTER1

Router>enable

Router#debug ip routing

IP routing debugging is on

Router#CONF

Router#conf

Router#configure TER

Router#configure TERminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#ip route 172.16.1.0 255.255.255.0 172.18.2.2

Router(config)#RT: SET_LAST_RDB for 172.16.1.0/24

NEW rdb: via 172.18.2.2

RT: add 172.16.1.0/24 via 172.18.2.2, static metric [1/0]

RT: NET-RED 172.16.1.0/24

Router(config)#ip route 192.168.2.0 255.255.255.0 172.18.2.2

Router(config)#RT: SET_LAST_RDB for 192.168.2.0/24

NEW rdb: via 172.18.2.2

RT: add 192.168.2.0/24 via 172.18.2.2, static metric [1/0]

RT: NET-RED 192.168.2.0/24

Router(config)#

Necesitarem la comanda «ip route destí màscara i next hop, en aquest cas: 192.168.2.0 255.255.255.0 172.18.2.2».

ROUTER2

Router>enable

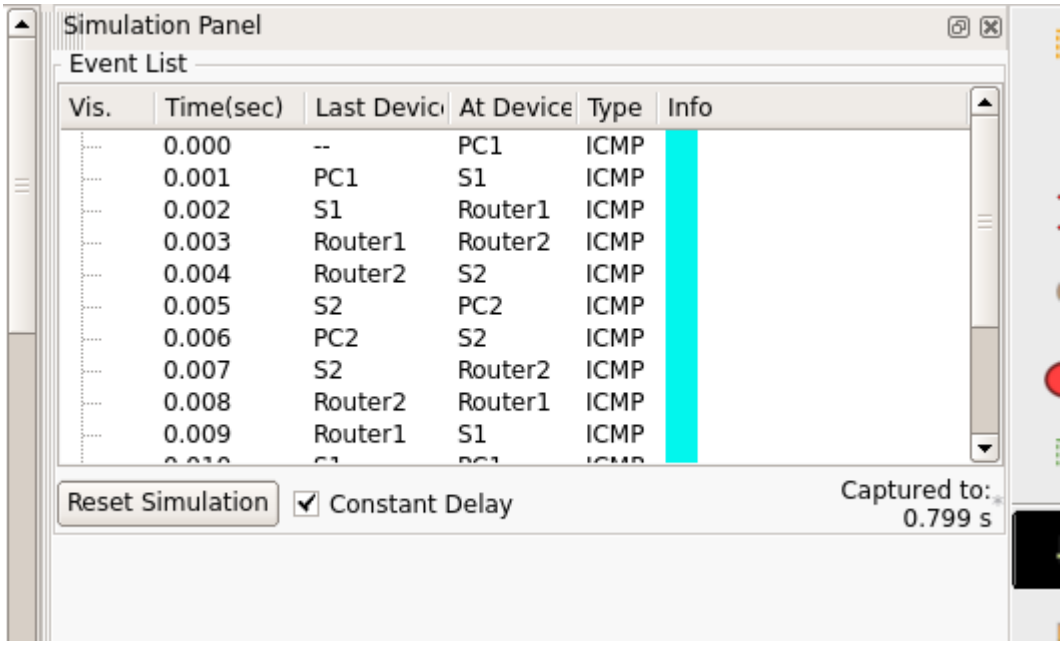
Router#confi
Router#configure ter
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 172.16.3.0 255.255.255.0 172.18.2.1
Router(config)#ip route 192.168.2.0 255.255.255.0 192.168.1.1
Router(config)#

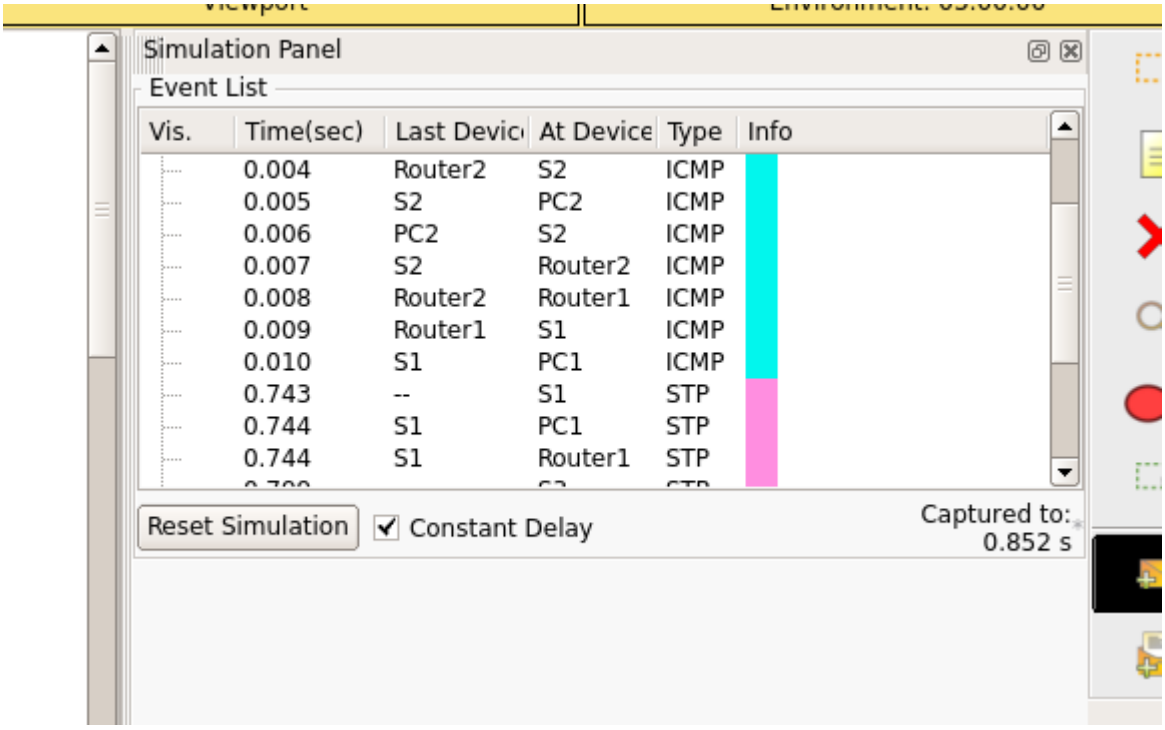
ROUTER3

```
Router>enable

Router#confi

Router#configure ter

Router#configure terminal

Enter configuration commands, one per line.  End with CNTL/Z.

Router(config)#ip route 172.16.1.0 255.255.255.0 192.168.1.2

Router(config)#ip route 172.16.3.0 255.255.255.0 192.168.1.2

Router(config)#
```

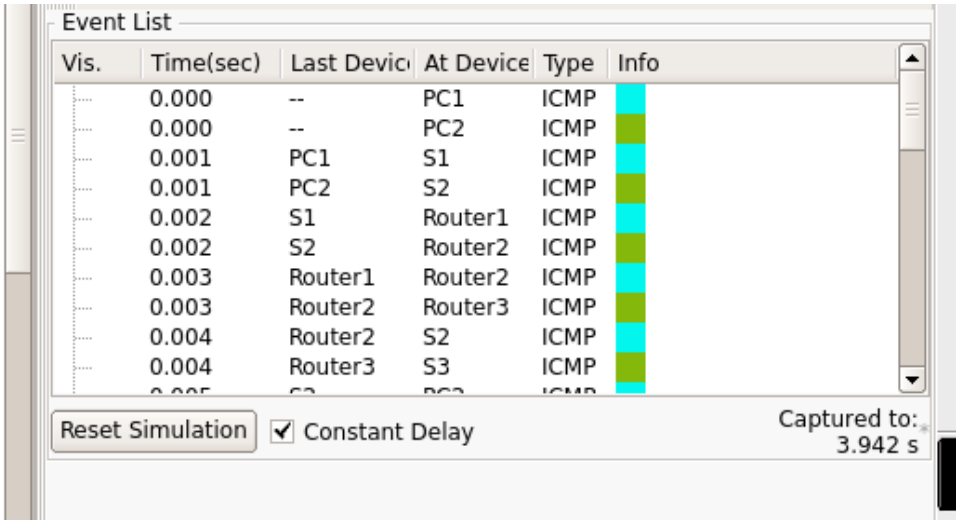
10. En el mode de simulació del Packet Tracer, envia 3 missatges ping i comprova que tant l'enviament del ping com el retorn de la resposta funcionen.

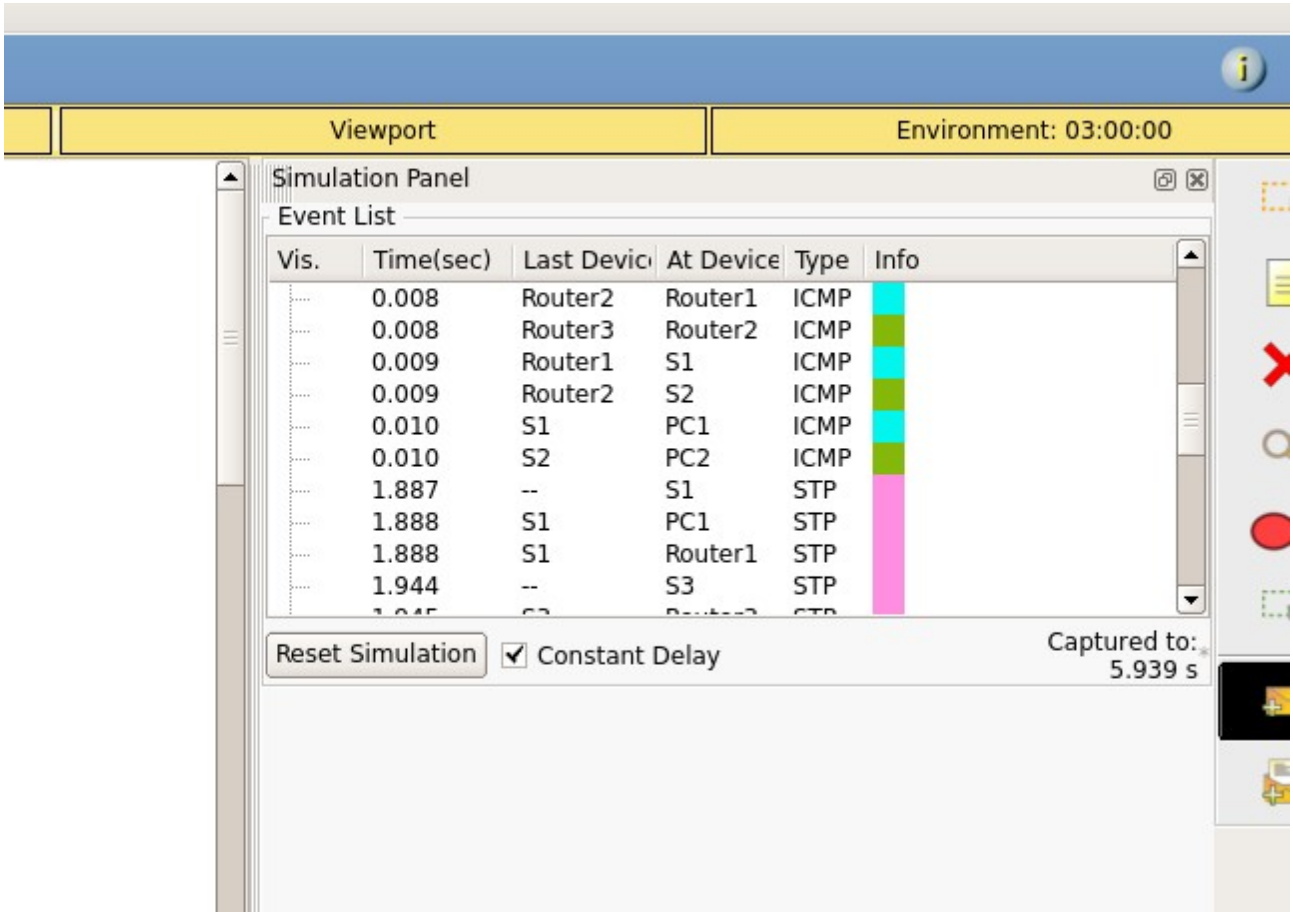
- El primer ping que vagi del PC1 al PC2



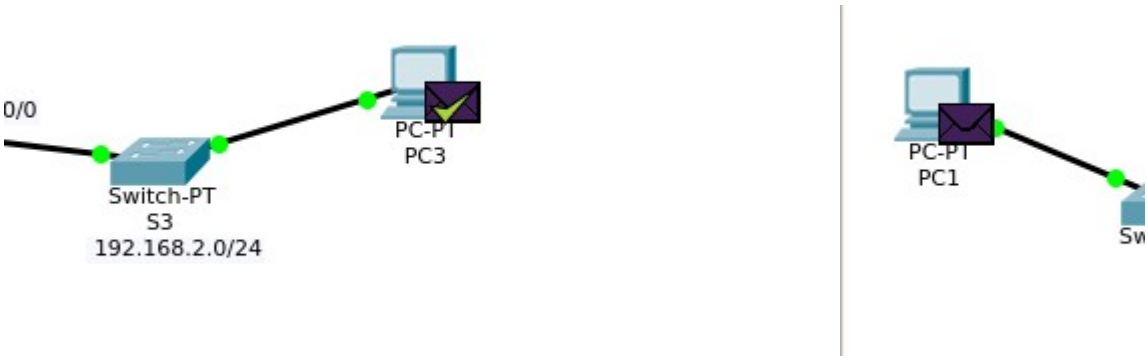


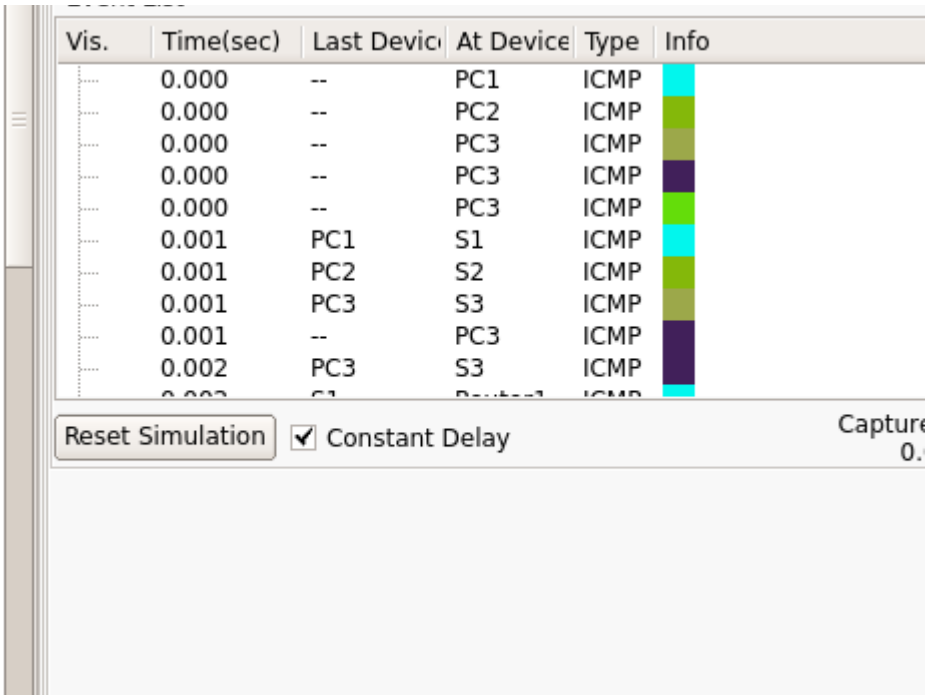
- El segon ping que vagi del PC2 al PC3





- El tercer ping que vagi del PC3 al PC1





VEIEM QUE TOTS ELS PINGS FUNCIONEN