

Universitat de Barcelona

FACULTAT DE MATEMÀTIQUES I INFORMÀTICA

INFORME PRÀCTICA 3: EL SIMULADOR
PACKET TRACER

Xarxes

Junjie Li i Manuel Liu Wang

Desembre 2022

1 Introducció

En aquestà pràctica hem de familiaritzarnos amb el packet tracer, per tal de fer això, configurarem una xarxa amb un router, un switch i 4 equips.

2 Descarrega i primers passos

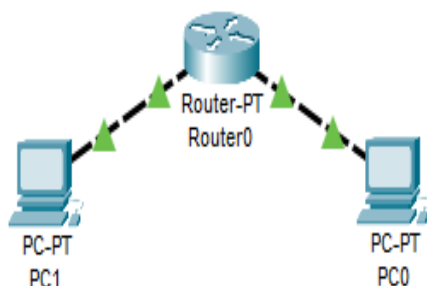


Figure 1: Representació de la configuració definida

Seguim el tutorial a la pràctica pas a pas per organitzar la nostra xarxa, assignem diferents adreces de xarxa a diferents interfícies del router, com la figura següent:

INTERFACE	
FastEthernet0/0	IP Configuration
FastEthernet1/0	IPv4 Address 192.168.1.1
Serial2/0	Subnet Mask 255.255.255.0
INTERFACE	
FastEthernet0/0	IP Configuration
FastEthernet1/0	IPv4 Address 161.116.0.1
Serial2/0	Subnet Mask 255.255.0.0

Figure 2: Configuració de la interface de router

Podem introduir **ipconfig** al cada PCs per comprovar que estem configurats correctament les adreces de IP, com la següent:

```
Connection-specific DNS Suffix...:
Link-local IPv6 Address . . . . .: FE80::2D0:58FF:FED8:BC1D
IPv6 Address. . . . .: ::
IPv4 Address. . . . .: 192.168.1.33
Subnet Mask . . . . .: 255.255.255.0
Default Gateway . . . . .: ::
                          192.168.1.1
```

Figure 3: Configuració de PC0

```
Connection-specific DNS Suffix...:
Link-local IPv6 Address . . . . .: FE80::2E0:B0FF:FE05:AAB2
IPv6 Address. . . . .: ::
IPv4 Address. . . . .: 161.116.0.33
Subnet Mask . . . . .: 255.255.0.0
Default Gateway . . . . .: ::
                          161.116.0.1
```

Figure 4: Configuració de PC1

A continuació, podem fer **ping** a l'adreça IP de l'altre a cada ordinador per veure si s'hi pot accedir correctament. Si l'accés és correcte, vol dir que els dos PCs estan connectats correctament a la xarxa.

```
Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: FE80::2E0:B0FF:FE05:AAB2
IPv6 Address.....: ::
IPv4 Address.....: 161.116.0.33
Subnet Mask.....: 255.255.0.0
Default Gateway.....: ::
                        161.116.0.1

Bluetooth Connection:

Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
                        0.0.0.0

C:\>ping 192.168.1.33

Pinging 192.168.1.33 with 32 bytes of data:

Reply from 192.168.1.33: bytes=32 time<1ms TTL=127
Reply from 192.168.1.33: bytes=32 time<1ms TTL=127
Reply from 192.168.1.33: bytes=32 time<1ms TTL=127
Reply from 192.168.1.33: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.33:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

```
Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: FE80::2D0:58FF:FED8:BC1D
IPv6 Address.....: ::
IPv4 Address.....: 192.168.1.33
Subnet Mask.....: 255.255.255.0
Default Gateway.....: ::
                        192.168.1.1

Bluetooth Connection:

Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
                        0.0.0.0

C:\>ping 161.116.0.33

Pinging 161.116.0.33 with 32 bytes of data:

Reply from 161.116.0.33: bytes=32 time<1ms TTL=127
Reply from 161.116.0.33: bytes=32 time<1ms TTL=127
Reply from 161.116.0.33: bytes=32 time<1ms TTL=127
Reply from 161.116.0.33: bytes=32 time=8ms TTL=127

Ping statistics for 161.116.0.33:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 8ms, Average = 2ms
```

Figure 5: Prova de connectivitat

Pregunta: Assigneu-li la IP 161.116.0.1. Si intenteu posar els dos ordinadors a la mateixa xarxa no ens deixa. Quina pense que és la raó? Es veuen els dos PCs?

Per a les xarxes connectades al mateix router, no està totalment permès tenir la mateixa ip, en cas contrari, en el cas d'assignació automàtica d'adreces: només la màquina que obtingui la ip primer entre les dues màquines pot utilitzar aquesta ip. Per tant, per al router, són el mateix PC, no dos PCs.

```
Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: FE80::2D0:58FF:FED8:BC1D
IPv6 Address.....: ::
IPv4 Address.....: 192.168.1.33
Subnet Mask.....: 255.255.255.0
Default Gateway.....: ::
                        192.168.1.1
```

Figure 6: Configuració de PC0

```
Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: FE80::2E0:B0FF:FE05:AAB2
IPv6 Address.....: ::
IPv4 Address.....: 192.168.1.33
Subnet Mask.....: 255.255.255.0
Default Gateway.....: ::
                        161.116.0.1
```

Figure 7: Configuració de PC1

3 Configuració de una xarxa d'àrea local simple

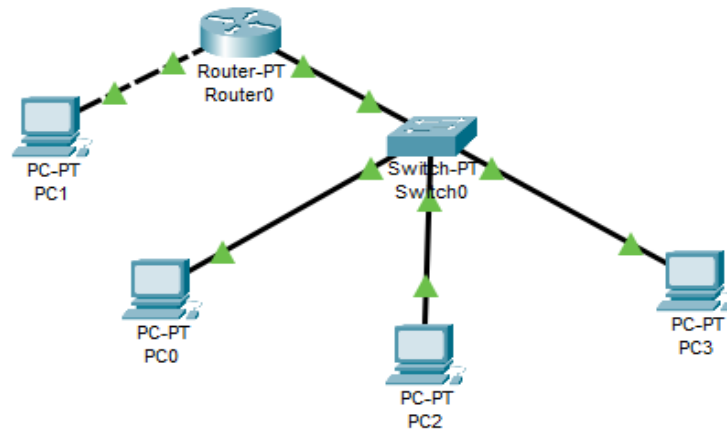


Figure 8: Representació de la configuració definida amb switch

- **Quantes xarxes tenim en aquesta configuració?**

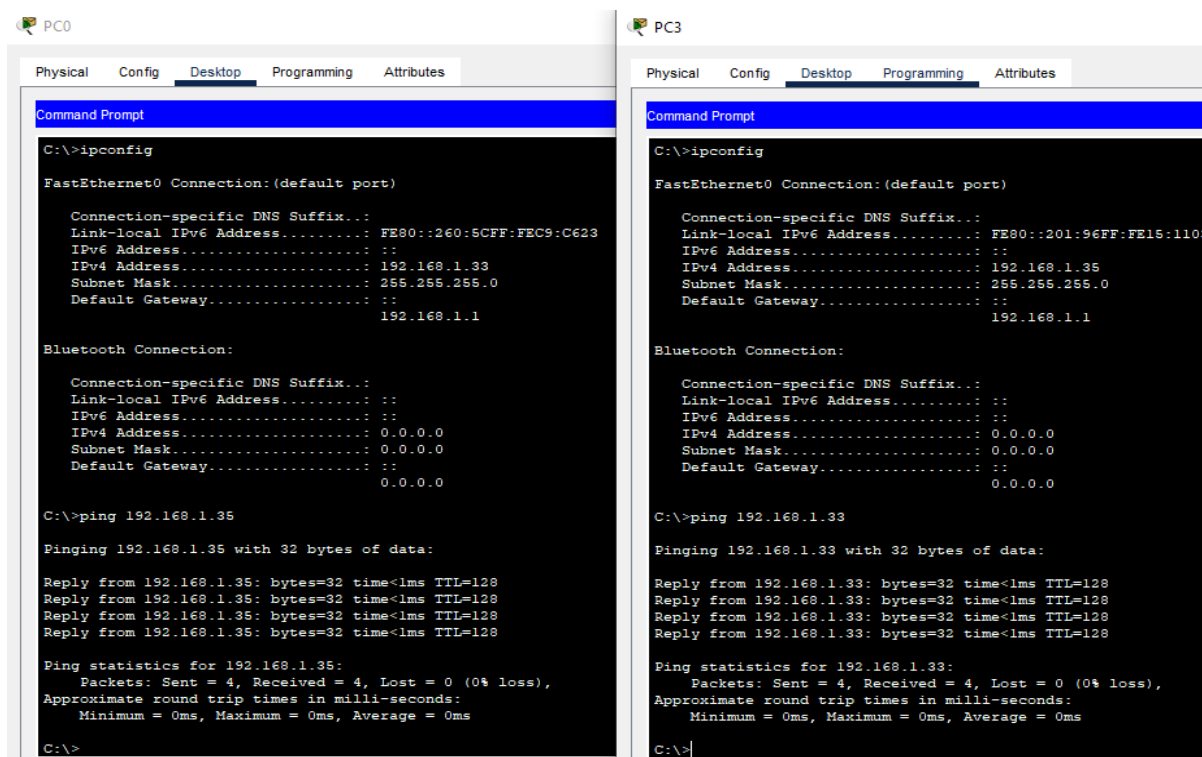
A la figura 8, hi ha dues xarxes.

Entre ells, router és un dispositiu de maquinari que per connecta dues o més xarxes.

- **Hi ha connectivitat entre tots els ordinadors?**

Sí, els 4 PCs de la figura de la figura 8 estan tots connectats entre si.

A les dues imatges següents, figura9 i figura10, vam provar PC0 i PC3, PC1 i PC3 respectivament, a partir dels resultats de les dues imatges següents, els 4 PCs estan connectats entre si.



The image shows two side-by-side windows from the Packet Tracer application, labeled PC0 and PC3. Both windows have tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active, showing a Command Prompt window.

PC0 Command Prompt:

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address...: FE80::260:5CFF:FEC9:C623
    IPv6 Address...:
    IPv4 Address...: 192.168.1.33
    Subnet Mask...: 255.255.255.0
    Default Gateway...:
    192.168.1.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address...:
    IPv6 Address...:
    IPv4 Address...: 0.0.0.0
    Subnet Mask...: 0.0.0.0
    Default Gateway...:
    0.0.0.0

C:\>ping 192.168.1.35

Pinging 192.168.1.35 with 32 bytes of data:

Reply from 192.168.1.35: bytes=32 time<1ms TTL=128
Reply from 192.168.1.35: bytes=32 time<1ms TTL=128
Reply from 192.168.1.35: bytes=32 time<1ms TTL=128
Reply from 192.168.1.35: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.35:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

PC3 Command Prompt:

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address...: FE80::201:96FF:FE15:1103
    IPv6 Address...:
    IPv4 Address...: 192.168.1.35
    Subnet Mask...: 255.255.255.0
    Default Gateway...:
    192.168.1.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address...:
    IPv6 Address...:
    IPv4 Address...: 0.0.0.0
    Subnet Mask...: 0.0.0.0
    Default Gateway...:
    0.0.0.0

C:\>ping 192.168.1.33

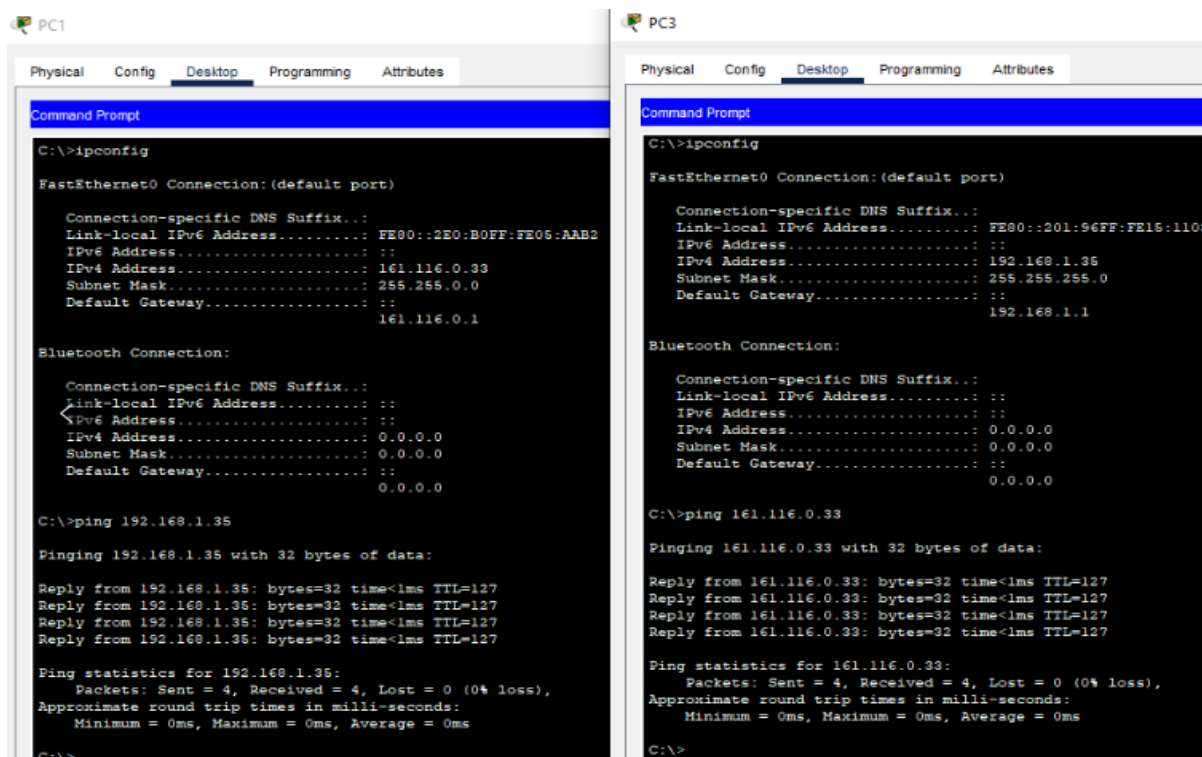
Pinging 192.168.1.33 with 32 bytes of data:

Reply from 192.168.1.33: bytes=32 time<1ms TTL=128
Reply from 192.168.1.33: bytes=32 time<1ms TTL=128
Reply from 192.168.1.33: bytes=32 time<1ms TTL=128
Reply from 192.168.1.33: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.33:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Figure 9: Prova de connectivitat entra PC0 i PC3



The image shows two side-by-side windows from the Packet Tracer application, labeled PC1 and PC3. Both windows have tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active, showing a Command Prompt window.

PC1 Command Prompt:

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address...: FE80::2E0:B0FF:FE06:AAB2
    IPv6 Address...:
    IPv4 Address...: 161.116.0.33
    Subnet Mask...: 255.255.255.0
    Default Gateway...:
    161.116.0.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address...:
    IPv6 Address...:
    IPv4 Address...: 0.0.0.0
    Subnet Mask...: 0.0.0.0
    Default Gateway...:
    0.0.0.0

C:\>ping 192.168.1.35

Pinging 192.168.1.35 with 32 bytes of data:

Reply from 192.168.1.35: bytes=32 time<1ms TTL=127
Reply from 192.168.1.35: bytes=32 time<1ms TTL=127
Reply from 192.168.1.35: bytes=32 time<1ms TTL=127
Reply from 192.168.1.35: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.35:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

PC3 Command Prompt:

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address...: FE80::201:96FF:FE15:1103
    IPv6 Address...:
    IPv4 Address...: 192.168.1.35
    Subnet Mask...: 255.255.255.0
    Default Gateway...:
    192.168.1.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address...:
    IPv6 Address...:
    IPv4 Address...: 0.0.0.0
    Subnet Mask...: 0.0.0.0
    Default Gateway...:
    0.0.0.0

C:\>ping 161.116.0.33

Pinging 161.116.0.33 with 32 bytes of data:

Reply from 161.116.0.33: bytes=32 time<1ms TTL=127
Reply from 161.116.0.33: bytes=32 time<1ms TTL=127
Reply from 161.116.0.33: bytes=32 time<1ms TTL=127
Reply from 161.116.0.33: bytes=32 time<1ms TTL=127

Ping statistics for 161.116.0.33:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Figure 10: Prova de connectivitat entra PC1 i PC3

- El cablejat que apareix en la xarxa 192.168.1.0 es UTP normal mentre que la connexió que hi ha entre PC1 i router es UTP creuada. Busqueu informació a Internet i expliqueu perquè?

Els cables directes s'utilitzen per connectar-se entre dispositius situats en capes adjacents al model de referència OSI. S'utilitzen habitualment ordinadors connectats a switch, switch connectats a router, router a ports Ethernet d'router, ordinadors a switch, ordinadors a concentradors.

Els cables creuats s'utilitzen per connectar dispositius a la mateixa capa del model de referència OSI. switch per switch, switch a concentrador, concentrador a concentrador, router a router, ordinador a ordinador.[1, 2]

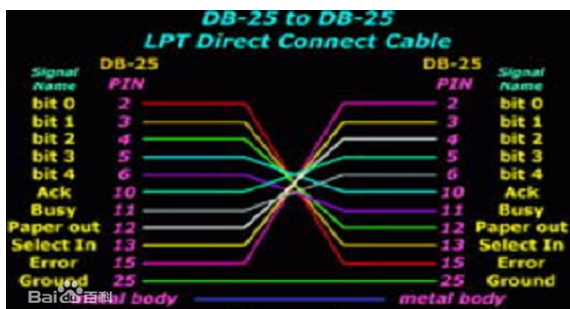


Figure 11: Cable directa[3]

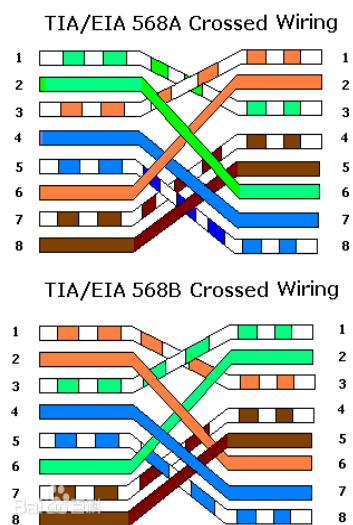


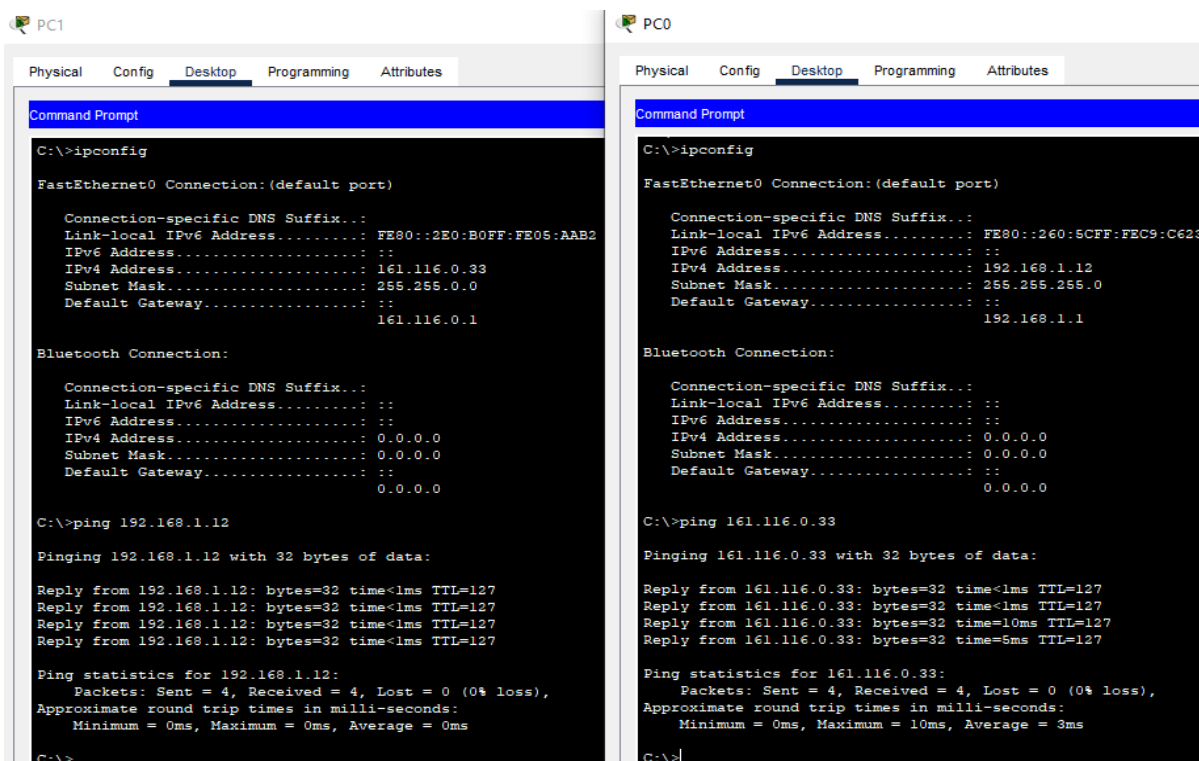
Figure 12: Cable creuada[4]

4 Configuració del DHCP

L'estructura de la xarxa és mateixa que figura 8, i utilitzem el mateix mètode que la pregunta anterior per provar la seva connectivitat.

Primer, provem PC1 i PC0 i utilitzem el mateix mètode de **ping** per comprovar si es poden connectar, després provem PC2 i PC3 per veure si també poden connectar correctament.

En tot cas, com es pot veure clarament als resultats següents, els quatre ordinadors estan connectats entre si.



The image shows two side-by-side screenshots of the Packet Tracer interface, specifically the 'Desktop' tab for PC1 and PC0. Both PCs have their 'FastEthernet0' interfaces configured with IPv4 and IPv6 addresses. PC1's IPv4 address is 161.116.0.33 and its IPv6 address is FE80::2E0:B0FF:FE05:AAB2. PC0's IPv4 address is 192.168.1.12 and its IPv6 address is FE80::260:5CFF:FEC9:C623. Both PCs have a subnet mask of 255.255.0.0 and a default gateway of 161.116.0.1 for PC1 and 192.168.1.1 for PC0. The 'Command Prompt' window in each PC shows the results of a ping test. PC1 has pinged 192.168.1.12, and PC0 has pinged 161.116.0.33. Both ping tests show successful results with 4 packets sent, 4 received, and 0% loss.

```

PC1 Command Prompt:
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::2E0:B0FF:FE05:AAB2
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 161.116.0.33
    Subnet Mask . . . . .: 255.255.0.0
    Default Gateway . . . . .: 161.116.0.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: ::
    0.0.0.0

C:\>ping 192.168.1.12

Pinging 192.168.1.12 with 32 bytes of data:

Reply from 192.168.1.12: bytes=32 time<1ms TTL=127
Reply from 192.168.1.12: bytes=32 time<1ms TTL=127
Reply from 192.168.1.12: bytes=32 time<1ms TTL=127
Reply from 192.168.1.12: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.12:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>

PC0 Command Prompt:
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::260:5CFF:FEC9:C623
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 192.168.1.12
    Subnet Mask . . . . .: 255.255.0.0
    Default Gateway . . . . .: ::
    192.168.1.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: ::
    0.0.0.0

C:\>ping 161.116.0.33

Pinging 161.116.0.33 with 32 bytes of data:

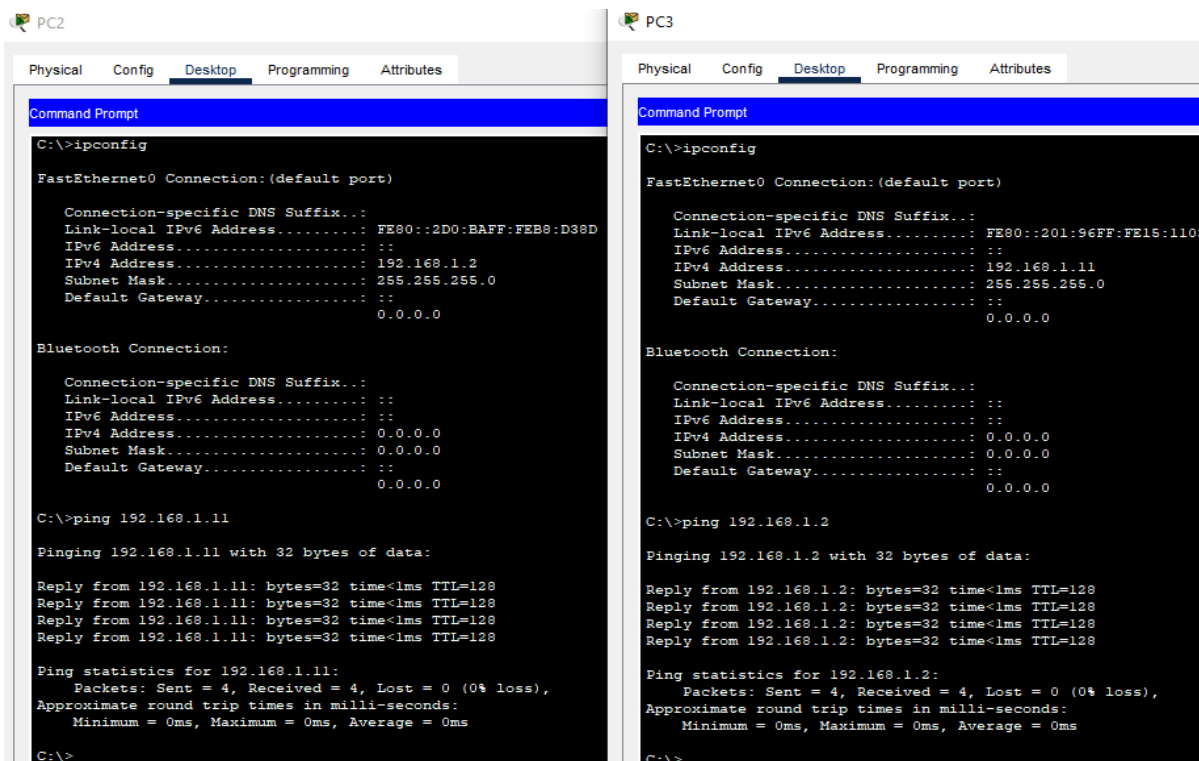
Reply from 161.116.0.33: bytes=32 time<1ms TTL=127
Reply from 161.116.0.33: bytes=32 time<1ms TTL=127
Reply from 161.116.0.33: bytes=32 time=10ms TTL=127
Reply from 161.116.0.33: bytes=32 time=5ms TTL=127

Ping statistics for 161.116.0.33:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 3ms

C:\>

```

Figure 13: Prova de connectivitat entra PC1 i PC0



The image shows two side-by-side screenshots of the Packet Tracer interface, specifically the 'Desktop' tab for PC2 and PC3. Both PCs have their 'FastEthernet0' interfaces configured with IPv4 and IPv6 addresses. PC2's IPv4 address is 192.168.1.11 and its IPv6 address is FE80::2D0:BAFF:FE08:D38D. PC3's IPv4 address is 192.168.1.12 and its IPv6 address is FE80::201:96FF:FE16:1103. Both PCs have a subnet mask of 255.255.255.0 and a default gateway of 0.0.0.0. The 'Command Prompt' window in each PC shows the results of a ping test. PC2 has pinged 192.168.1.11, and PC3 has pinged 192.168.1.2. Both ping tests show successful results with 4 packets sent, 4 received, and 0% loss.

```

PC2 Command Prompt:
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::2D0:BAFF:FE08:D38D
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 192.168.1.11
    Subnet Mask . . . . .: 255.255.255.0
    Default Gateway . . . . .: 0.0.0.0

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: ::
    0.0.0.0

C:\>ping 192.168.1.11

Pinging 192.168.1.11 with 32 bytes of data:

Reply from 192.168.1.11: bytes=32 time<1ms TTL=128
Reply from 192.168.1.11: bytes=32 time<1ms TTL=128
Reply from 192.168.1.11: bytes=32 time<1ms TTL=128
Reply from 192.168.1.11: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>

PC3 Command Prompt:
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::201:96FF:FE16:1103
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 192.168.1.12
    Subnet Mask . . . . .: 255.255.255.0
    Default Gateway . . . . .: 0.0.0.0

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: ::
    0.0.0.0

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>

```

Figure 14: Prova de connectivitat entra PC2 i PC3

Quines són les MAC dels diferents dispositius que hi teniu?

Les MAC dels diferents dispositius que són:

Router:

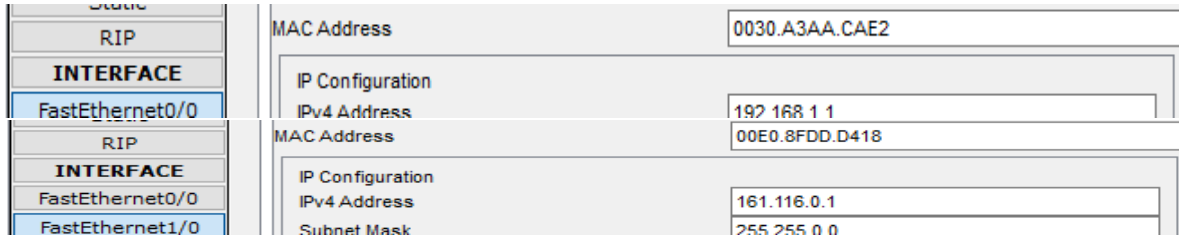


Figure 15: MAC de router

Diferents dispositius de PCs:



Figure 16: MAC PC1

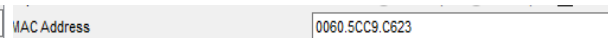


Figure 17: MAC PC0



Figure 18: MAC PC2

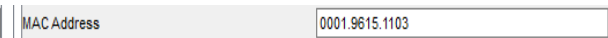
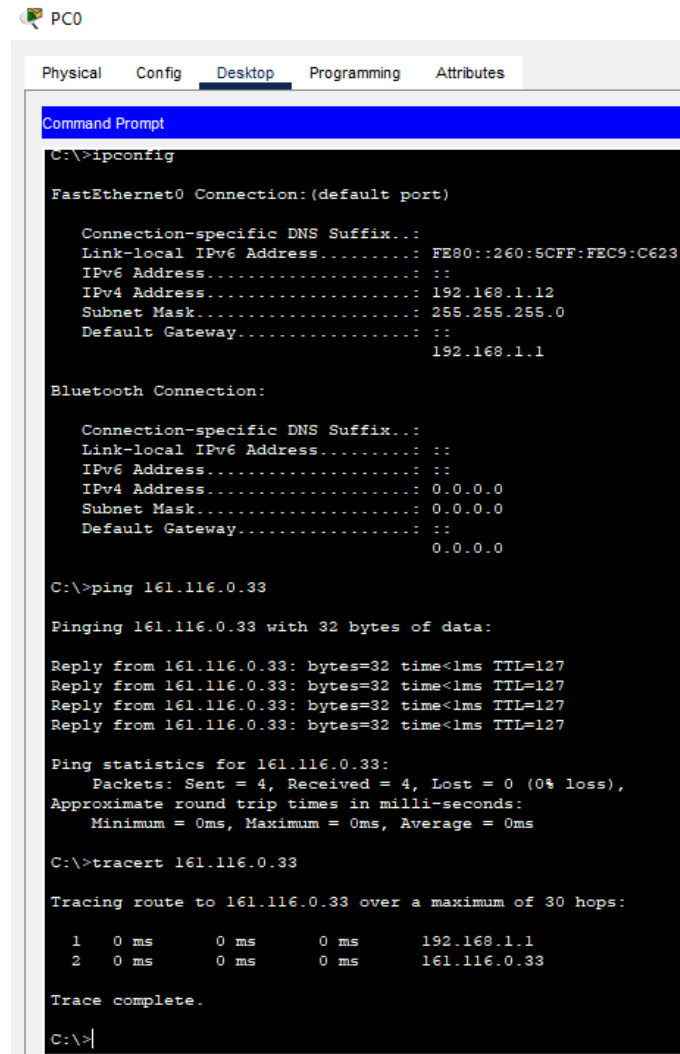


Figure 19: MAC PC3

Apliqueu i expliqueu les diferents comandes estudiades a la pràctica 1 en aquesta pràctica.

La majoria de les comandes que es mostren a practical es poden utilitzar aquí, i després mostrarem breument algunes comandes convenients.

En primer lloc, els més utilitzats han de ser **ipconfig**, **ping** i **tracert**, també els hem utilitzat en altres exercicis anteriors, es pot dir que són les comandes universals.



```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ipconfig

FastEthernet0 Connection: (default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::260:5CFF:FEC9:C623
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 192.168.1.12
    Subnet Mask . . . . .: 255.255.255.0
    Default Gateway . . . . .: ::
                                   192.168.1.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: ::
                                   0.0.0.0

C:\>ping 161.116.0.33

Pinging 161.116.0.33 with 32 bytes of data:

Reply from 161.116.0.33: bytes=32 time<1ms TTL=127
Reply from 161.116.0.33: bytes=32 time<1ms TTL=127
Reply from 161.116.0.33: bytes=32 time<1ms TTL=127
Reply from 161.116.0.33: bytes=32 time<1ms TTL=127

Ping statistics for 161.116.0.33:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>tracert 161.116.0.33

Tracing route to 161.116.0.33 over a maximum of 30 hops:

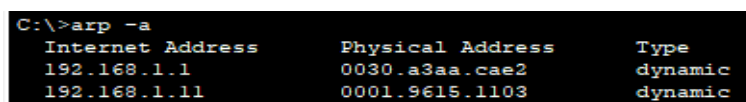
  0  0 ms    0 ms    0 ms    192.168.1.1
  1  0 ms    0 ms    0 ms    161.116.0.33

Trace complete.

C:\>
```

Figure 20: ipconfig, ping, tracert

A més, les comandes funcionals com **arp** i **netstat** també són indispensables:



```
C:\>arp -a

Internet Address      Physical Address      Type
192.168.1.1           0030.a3aa.cae2       dynamic
192.168.1.11          0001.9615.1103       dynamic
```

Figure 21: arp -a

```
C:\>netstat -r

Route Table
=====

Interface List
0x1 ..... PT TCP Loopback interface
0x2 ...00 16 6f 0d 88 ec ..... PT Ethernet interface
0x1 ..... PT TCP Loopback interface
0x2 ...00 16 6f 0d 88 ec ..... PT Bluetooth interface
=====

Active Routes:
Network Destination    Netmask          Gateway       Interface  Metric
      0.0.0.0           0.0.0.0         0.0.0.0       192.168.1.2      1
Default Gateway:       0.0.0.0
=====

Persistent Routes:
None
```

Figure 22: netstat

I al final com d'algunes les comandes simples anteriors, també podem utilitzar **ssh** o **telnet** per accedir a altres ordinadors. La configuració aquí és relativament complicada, així que no ho demostraré.

5 Conclusió

En aquesta pràctica hem après a configurar una xarxa, connectar els diferents equips al router i al switch, configurar les seves adreces IP i la mascara corresponent.

References

- [1] <https://blog.51cto.com/cisco2600/663080>
- [2] <https://blog.csdn.net/SuperITPro/article/details/8097507>
- [3] [https://baike.baidu.com/item/%E5%8F%8C%E7%BB%9E%E7%BA%BF/487416?
fromModule=lemma_inlink](https://baike.baidu.com/item/%E5%8F%8C%E7%BB%9E%E7%BA%BF/487416?fromModule=lemma_inlink)
- [4] [https://baike.baidu.com/item/%E4%BA%A4%E5%8F%89%E7%BA%BF?fromModule=
lemma_inlink](https://baike.baidu.com/item/%E4%BA%A4%E5%8F%89%E7%BA%BF?fromModule=lemma_inlink)