

# Comunicaciones

## Trabajo Práctico IPv6

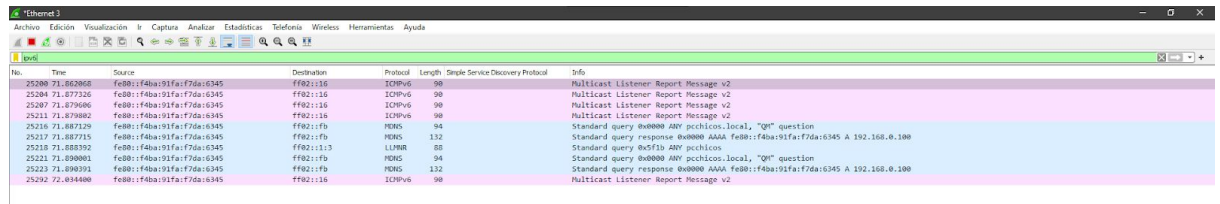
Díaz Agustín

Litmanovich Ignacio

# WireShark

Ítem a

Selecciona la interfaz de Ethernet



The screenshot shows the Wireshark interface with a packet capture on the 'Ethernet 3' interface. The packet list shows several packets, including Multicast Listener Report Messages and Standard Query Responses.

No.	Time	Source	Destination	Protocol	Length	Single Service Discovery Protocol	Info
25200	71.862868	fe80::f4ba:91fa:f7da:6345	ff02::16	ICMPv6	98		Multicast Listener Report Message v2
25204	71.877326	fe80::f4ba:91fa:f7da:6345	ff02::16	ICMPv6	98		Multicast Listener Report Message v2
25207	71.879696	fe80::f4ba:91fa:f7da:6345	ff02::16	ICMPv6	98		Multicast Listener Report Message v2
25211	71.879882	fe80::f4ba:91fa:f7da:6345	ff02::16	ICMPv6	98		Multicast Listener Report Message v2
25216	71.887129	fe80::f4ba:91fa:f7da:6345	ff02::fb	NDNS	94		Standard query response 0x0000 AAAA fe80::f4ba:91fa:f7da:6345 A 192.168.0.100
25217	71.887115	fe80::f4ba:91fa:f7da:6345	ff02::fb	NDNS	112		Standard query response 0x0000 AAAA fe80::f4ba:91fa:f7da:6345 A 192.168.0.100
25218	71.888392	fe80::f4ba:91fa:f7da:6345	ff02::1:3	LUMR	88		Standard query response 0x0000 AAAA fe80::f4ba:91fa:f7da:6345 A 192.168.0.100
25221	71.898801	fe80::f4ba:91fa:f7da:6345	ff02::fb	NDNS	94		Standard query response 0x0000 AAAA fe80::f4ba:91fa:f7da:6345 A 192.168.0.100
25223	71.898392	fe80::f4ba:91fa:f7da:6345	ff02::fb	NDNS	112		Standard query response 0x0000 AAAA fe80::f4ba:91fa:f7da:6345 A 192.168.0.100
25292	72.834480	fe80::f4ba:91fa:f7da:6345	ff02::16	ICMPv6	98		Multicast Listener Report Message v2

Ítem c

```
PS C:\Users\Eduardo> ipconfig

Configuración IP de Windows

Adaptador de Ethernet Ethernet 3:

    Sufijo DNS específico para la conexión. . . : fibertel.com.ar
    Vínculo: dirección IPv6 local. . . : fe80::f4ba:91fa:f7da:6345%13
    Dirección IPv4. . . . . : 192.168.0.100
    Máscara de subred. . . . . : 255.255.255.0
    Puerta de enlace predeterminada. . . . . : 192.168.0.3

Adaptador de Ethernet VirtualBox Host-Only Network:

    Sufijo DNS específico para la conexión. . . :
    Vínculo: dirección IPv6 local. . . : fe80::24e5:b4af:852d:d910%18
    Dirección IPv4. . . . . : 192.168.56.1
    Máscara de subred. . . . . : 255.255.255.0
    Puerta de enlace predeterminada. . . . . :

PS C:\Users\Eduardo>
```

Ítem d

```
PS C:\Users\Eduardo> ping loopback

Haciendo ping a pcchicos [::1] con 32 bytes de datos:
Respuesta desde ::1: tiempo<1m
Respuesta desde ::1: tiempo<1m
Respuesta desde ::1: tiempo<1m
Respuesta desde ::1: tiempo<1m

Estadísticas de ping para ::1:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
    (0% perdidos),
    Tiempos aproximados de ida y vuelta en milisegundos:
    Mínimo = 0ms, Máximo = 0ms, Media = 0ms
PS C:\Users\Eduardo>
```

Ítem e

```
PS C:\Users\Eduardo> ping 192.168.0.5

Haciendo ping a 192.168.0.5 con 32 bytes de datos:
Respuesta desde 192.168.0.5: bytes=32 tiempo=354ms TTL=64
Respuesta desde 192.168.0.5: bytes=32 tiempo=237ms TTL=64
Respuesta desde 192.168.0.5: bytes=32 tiempo=154ms TTL=64
Respuesta desde 192.168.0.5: bytes=32 tiempo=372ms TTL=64

Estadísticas de ping para 192.168.0.5:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
        (0% perdidos),
    Tiempos aproximados de ida y vuelta en milisegundos:
        Mínimo = 154ms, Máximo = 372ms, Media = 279ms
```

```
PS C:\Users\Eduardo> ping -6 fe80::f4ba:91fa:f7da:6345%13

Haciendo ping a fe80::f4ba:91fa:f7da:6345%13 con 32 bytes de datos:
Respuesta desde fe80::f4ba:91fa:f7da:6345%13: tiempo<1m
Respuesta desde fe80::f4ba:91fa:f7da:6345%13: tiempo<1m
Respuesta desde fe80::f4ba:91fa:f7da:6345%13: tiempo<1m
Respuesta desde fe80::f4ba:91fa:f7da:6345%13: tiempo<1m

Estadísticas de ping para fe80::f4ba:91fa:f7da:6345%13:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
        (0% perdidos),
    Tiempos aproximados de ida y vuelta en milisegundos:
        Mínimo = 0ms, Máximo = 0ms, Media = 0ms
PS C:\Users\Eduardo>
```

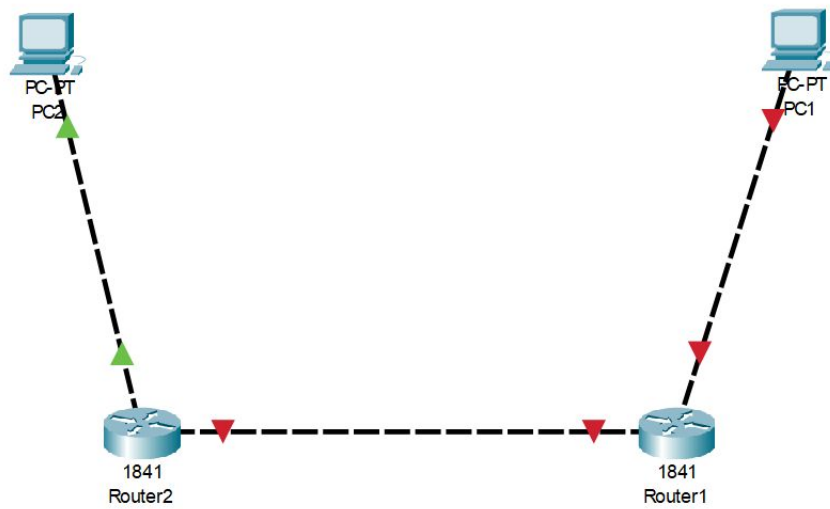
Ítem g

No.	Time	Source	Destination	Protocol	Length	Service	Discovery Protocol	Info
2192.	590.443216	192.168.0.100	192.168.0.5	ICMP	74			Echo (ping) request id=0x0001, seq=24/6144, ttl=128 (reply in 219248)
2192.	590.444639	192.168.0.5	192.168.0.100	ICMP	74			Echo (ping) reply id=0x0001, seq=24/6144, ttl=64 (request in 219247)
2194.	599.455591	192.168.0.100	192.168.0.5	ICMP	74			Echo (ping) request id=0x0001, seq=25/6400, ttl=128 (reply in 219414)
2194.	599.584655	192.168.0.5	192.168.0.100	ICMP	74			Echo (ping) reply id=0x0001, seq=25/6400, ttl=64 (request in 219407)
2195.	600.466933	192.168.0.100	192.168.0.5	ICMP	74			Echo (ping) request id=0x0001, seq=26/6656, ttl=128 (reply in 219607)
2196.	600.718306	192.168.0.5	192.168.0.100	ICMP	74			Echo (ping) reply id=0x0001, seq=26/6656, ttl=64 (request in 219556)
3182.	906.056476	192.168.0.100	192.168.0.5	ICMP	74			Echo (ping) request id=0x0001, seq=27/6912, ttl=128 (reply in 318450)
3184.	907.051238	192.168.0.5	192.168.0.100	ICMP	74			Echo (ping) reply id=0x0001, seq=27/6912, ttl=64 (request in 318277)
3186.	907.721376	192.168.0.100	192.168.0.5	ICMP	74			Echo (ping) request id=0x0001, seq=28/7168, ttl=128 (reply in 318674)
3186.	907.959145	192.168.0.5	192.168.0.100	ICMP	74			Echo (ping) reply id=0x0001, seq=28/7168, ttl=64 (request in 318636)
3189.	908.742337	192.168.0.100	192.168.0.5	ICMP	74			Echo (ping) request id=0x0001, seq=29/7424, ttl=128 (reply in 319033)
3190.	908.896301	192.168.0.5	192.168.0.100	ICMP	74			Echo (ping) reply id=0x0001, seq=29/7424, ttl=64 (request in 318993)
3194.	909.752676	192.168.0.100	192.168.0.5	ICMP	74			Echo (ping) request id=0x0001, seq=30/7680, ttl=128 (reply in 319626)
3196.	910.125130	192.168.0.5	192.168.0.100	ICMP	74			Echo (ping) reply id=0x0001, seq=30/7680, ttl=64 (request in 319426)

# Packet Tracer

## Tarea 1

Ítems a y b



Item c

PC2

Physical **Config** Desktop Programming Attributes

**GLOBAL**

Settings

Algorithm Settings

**INTERFACE**

FastEthernet0

Bluetooth

**FastEthernet0**

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0060.47CE.0A78

IP Configuration

☐ DHCP

☒ Static

IP Address

Subnet Mask

IPv6 Configuration

☐ DHCP

☒ Auto Config

☐ Static

IPv6 Address 01:DB8:1:0:260:47FF:FECE:A78 / 64

Link Local Address: FE80::260:47FF:FECE:A78

☐ Top

Item d

PC1

Physical

Config

Desktop

Programming

Attributes

GLOBAL

Settings

Algorithm Settings

INTERFACE

FastEthernet0

Bluetooth

Global Settings

Display Name

PC1

Interfaces

FastEthernet0

Gateway/DNS IPv4

DHCP

Static

Gateway

DNS Server

Gateway/DNS IPv6

DHCP

Auto Config

Static

IPv6 Gateway

IPv6 DNS Server

Top

## Item e y f

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Compliance with U.S. and local country laws: By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wvl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

Cisco 1841 (revision 5.0) with 114688K/16384K bytes of memory.
Processor board ID FTX0947Z18E
M860 processor: part number 0, mask 49
2 FastEthernet/IEEE 802.3 interface(s)
191K bytes of NVRAM.
63488K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: n

Press RETURN to get started!

Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ipv6 unicast-routing
Router(config)#interface FastEthernet0/0
Router(config-if)#ipv6 address 2001:db8:1::/64 eui-64
Router(config-if)#ipv6 enable
Router(config-if)#ipv6 rip RED enable
Router(config-if)#no shutdown

Router(config-if)#
%LINK-S-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-S-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ipv6 address 2001:db8:2::/64 eui-64
Router(config-if)#ipv6 enable
^
% Invalid input detected at '^' marker.

Router(config-if)#ipv6 enable
Router(config-if)#ipv6 rip RED enable
Router(config-if)#no shutdown

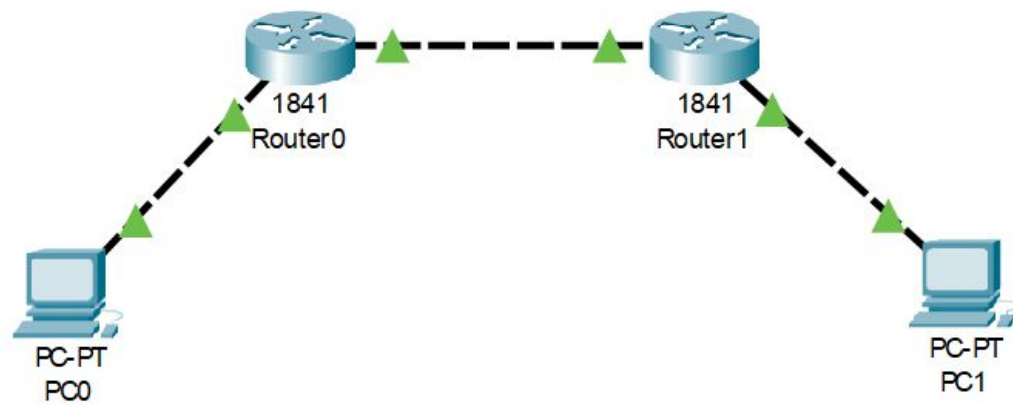
Router(config-if)#
%LINK-S-CHANGED: Interface FastEthernet0/1, changed state to up
exit
Router(config)#
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

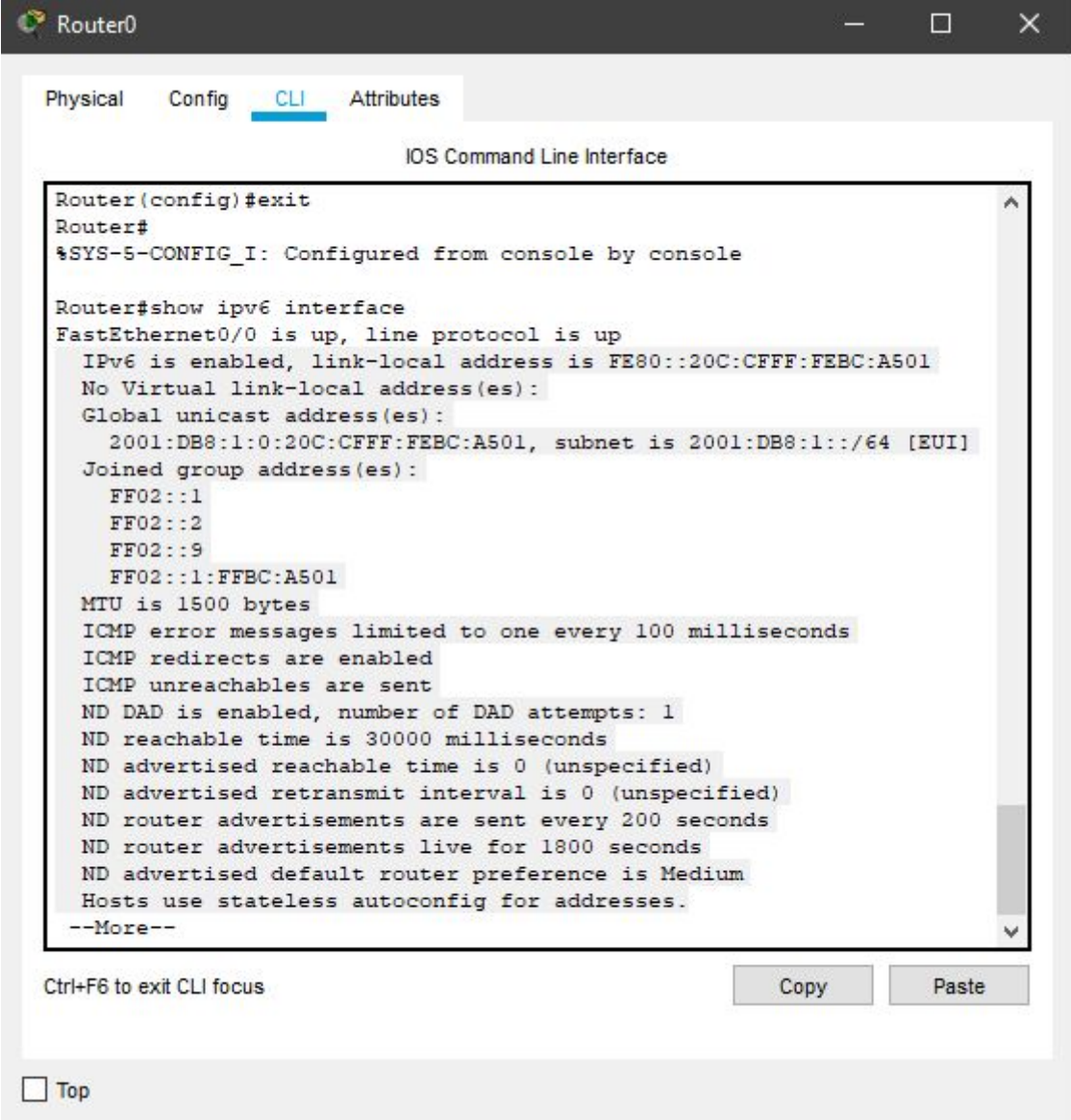
Red final





## TAREA 2

### Ítem a



The screenshot shows the Router0 CLI interface with the 'CLI' tab selected. The command history shows the user exiting configuration mode and running 'show ipv6 interface'. The output displays the IPv6 configuration for FastEthernet0/0, including the link-local address, global unicast address, and various protocol settings.

```
Router0
Physical Config CLI Attributes
IOS Command Line Interface

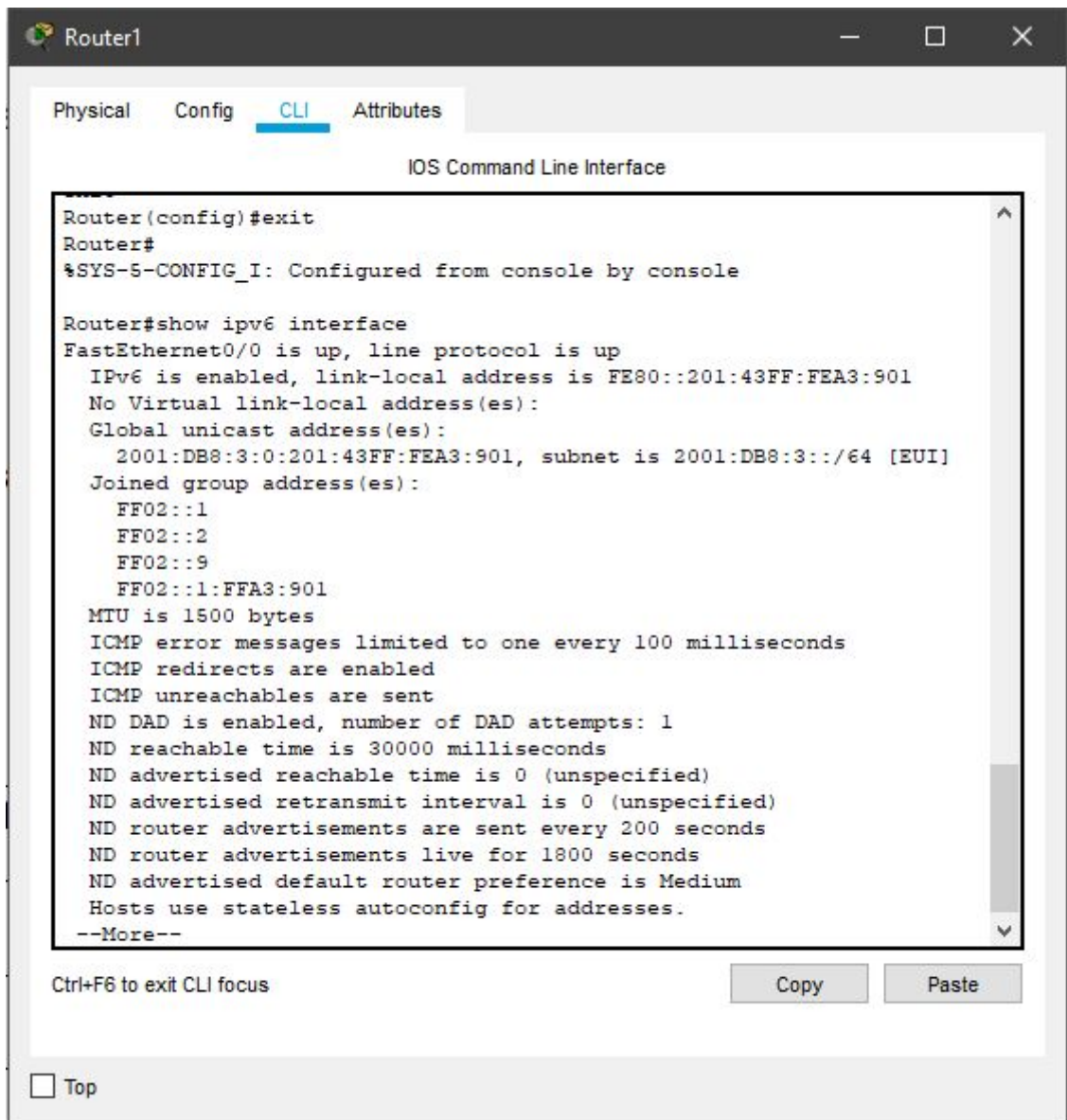
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ipv6 interface
FastEthernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::20C:CFFF:FEBC:A501
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:1:0:20C:CFFF:FEBC:A501, subnet is 2001:DB8:1::/64 [EUI]
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::9
    FF02::1:FEBC:A501
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  ND advertised reachable time is 0 (unspecified)
  ND advertised retransmit interval is 0 (unspecified)
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.
--More--
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top



Ítem b

Dispositivo		IPv6	Dir. IP Local	Dir. IP Global
Router0	Fa0/0	SI	FE80::20C:CFFF:FEBC:A501	2001:DB8:1:0:20C:CFFF:FEBC:A501
	Fa0/1	SI	FE80::20C:CFFF:FEBC:A502	2001:DB8:2:0:20C:CFFF:FEBC:A502
Router1	Fa0/0	SI	FE80::201:43FF:FEA3:901	2001:DB8:3:0:201:43FF:FEA3:901
	Fa0/1	SI	FE80::201:43FF:FEA3:902	2001:DB8:2:0:201:43FF:FEA3:902

- a. Una dirección IPv6 tiene un tamaño de 128 bits y se compone de ocho campos de 16 bits, cada uno de ellos unido por dos puntos. Cada campo debe contener un número hexadecimal, a diferencia de la notación decimal con puntos de las direcciones IPv4
- b.
  - Prefijo Subred: 2001:DB8:1
  - ID Subred: 0
  - ID Interface: 20C:CFFF:FEBC:A501
- c. La dirección MAC de la interface Fa0/0 del Router0 es 00:0C:CF:BC:A5:01. Se consigue a partir de la aplicación del algoritmo definido por EUI64 sobre la dirección local (FE80::20C:CFFF:FEBC:A501) de la siguiente manera:
  - Quitamos el prefijo FE80
  - Invertimos el 7mo bit
  - Eliminamos el fragmento FFEE del medio
  - Pasamos a la notación de direcciones MAC

Item c

The screenshot shows a Cisco Packet Tracer window titled "Router0". It has four tabs: "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is selected and highlighted with a blue underline. Below the tabs, the text "IOS Command Line Interface" is centered. The main area of the window contains a text box with the following text:

```
Router#EUI64
Translating "EUI64"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer
address

Router#show ipv6 route
IPv6 Routing Table - 6 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   2001:DB8:1::/64 [0/0]
    via ::, FastEthernet0/0
L   2001:DB8:1:0:20C:CFFF:FEBC:A501/128 [0/0]
    via ::, FastEthernet0/0
C   2001:DB8:2::/64 [0/0]
    via ::, FastEthernet0/1
L   2001:DB8:2:0:20C:CFFF:FEBC:A502/128 [0/0]
    via ::, FastEthernet0/1
R   2001:DB8:3::/64 [120/2]
    via FE80::201:43FF:FEA3:902, FastEthernet0/1
L   FF00::/8 [0/0]
    via ::, Null0
Router#EUI64
```

Below the text box, there is a status bar that says "Ctrl+F6 to exit CLI focus". To the right of this text are two buttons: "Copy" and "Paste". At the bottom left of the window, there is a checkbox labeled "Top" which is currently unchecked.

Router1

Physical

Config

CLI

Attributes

IOS Command Line Interface

```
Router>
Router>ipv6 route
      ^
% Invalid input detected at '^' marker.

Router>show ipv6 route
IPv6 Routing Table - 6 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
R   2001:DB8:1::/64 [120/2]
    via FE80::20C:CFFF:FEBC:A502, FastEthernet0/1
C   2001:DB8:2::/64 [0/0]
    via ::, FastEthernet0/1
L   2001:DB8:2:0:201:43FF:FEA3:902/128 [0/0]
    via ::, FastEthernet0/1
C   2001:DB8:3::/64 [0/0]
    via ::, FastEthernet0/0
L   2001:DB8:3:0:201:43FF:FEA3:901/128 [0/0]
    via ::, FastEthernet0/0
L   FF00::/8 [0/0]
    via ::, Null0
Router>
```

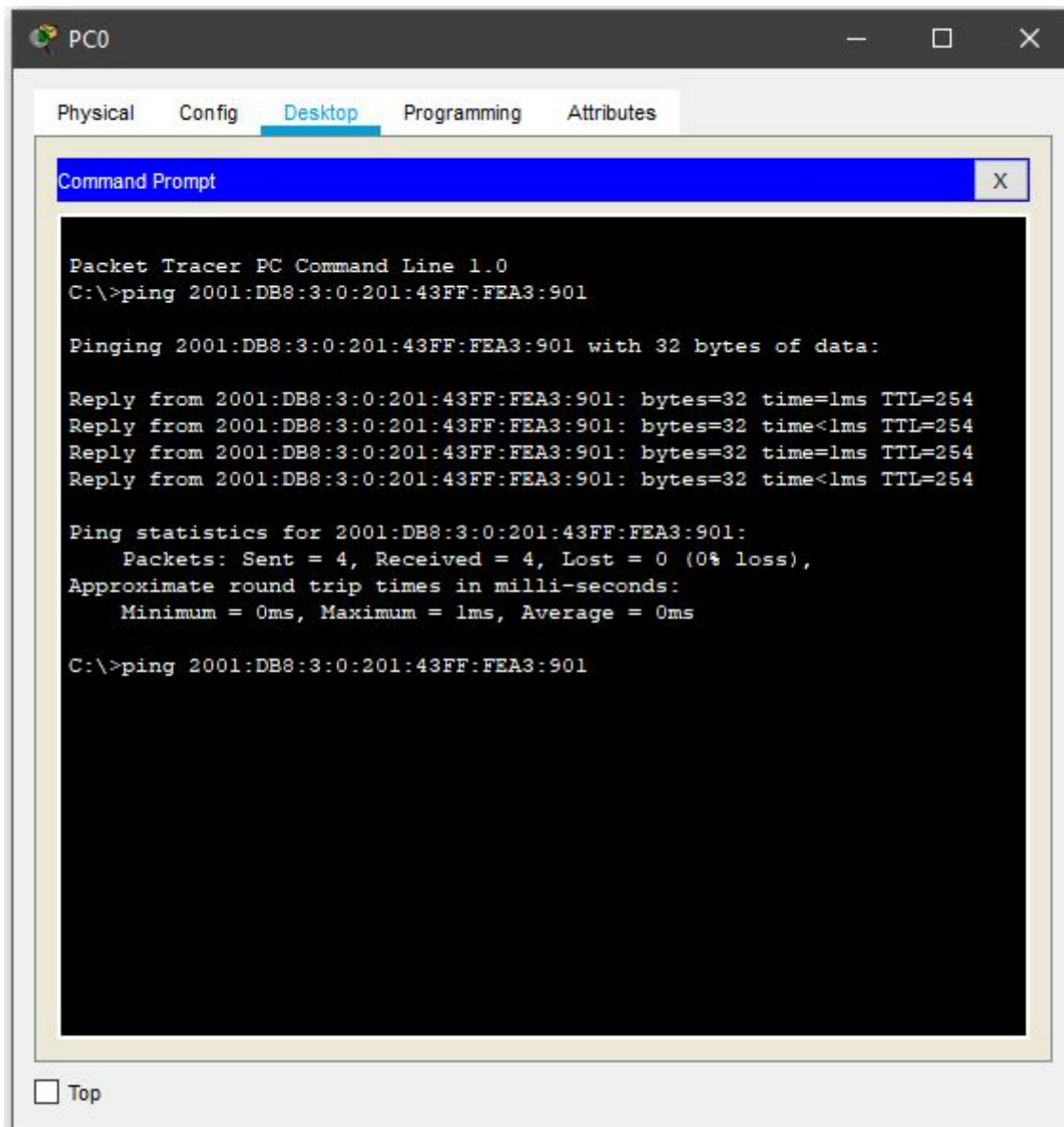
Ctrl+F6 to exit CLI focus

Copy

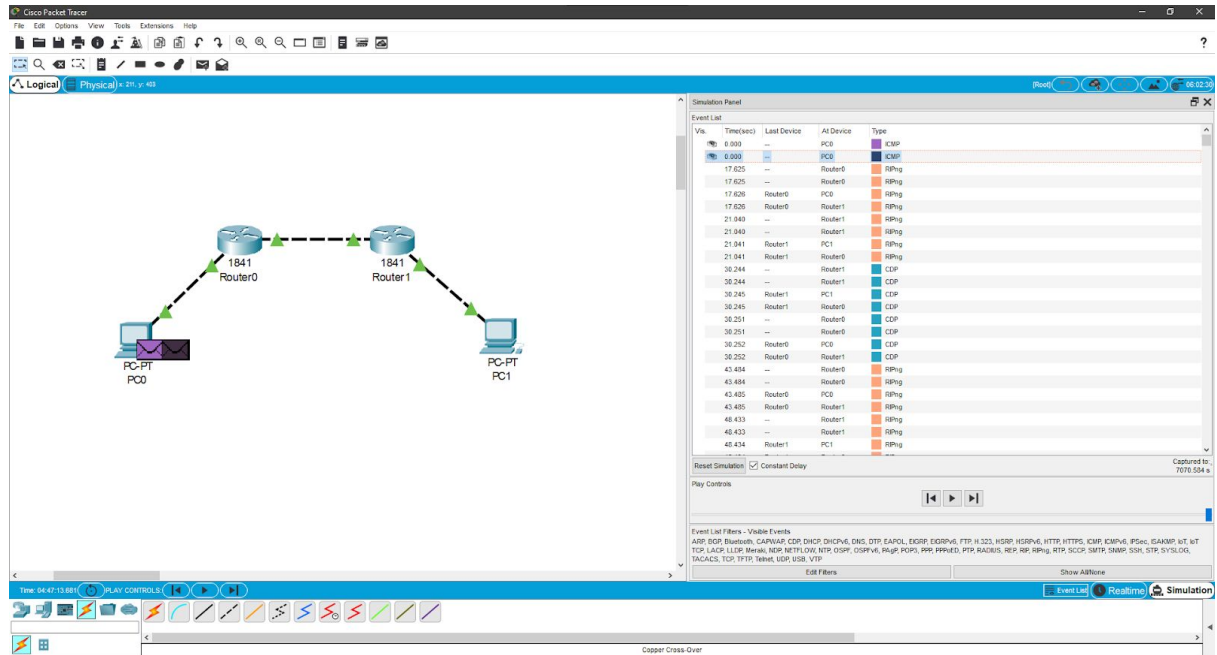
Paste

☐ Top

Ítem d



## Tarea 3





## Tarea 4

### Ítem a

PDU Information at Device: PC0

OSI Model

Outbound PDU Details

At Device: PC0  
Source: PC0  
Destination: PC1

In Layers

Layer7  
Layer6  
Layer5  
Layer4  
Layer3  
Layer2  
Layer1

Out Layers

Layer7  
Layer6  
Layer5  
Layer4  
**Layer 3: ICMP Message Type: 8**  
Layer2  
Layer1

1. The Ping process starts the next ping request.  
2. The Ping process creates an ICMP Echo Request message and sends it to the lower process.  
3. The port does not have an IP address.  
4. The device drops the packet.

Challenge Me

<< Previous Layer

Next Layer >>

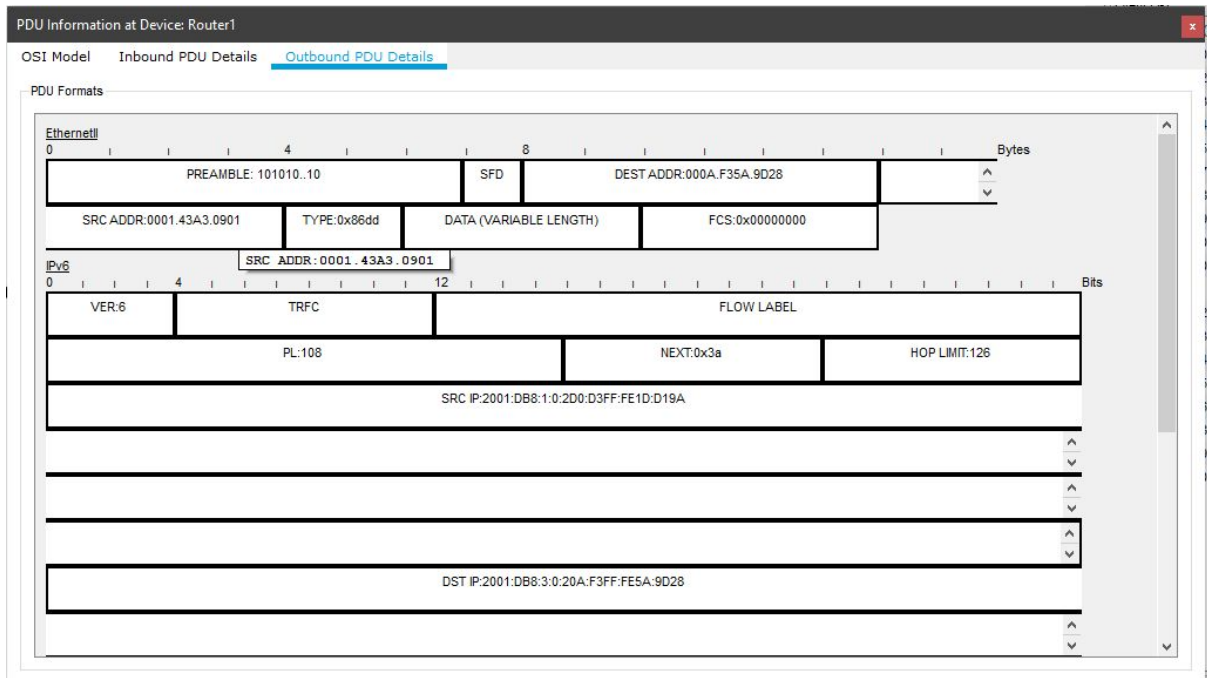
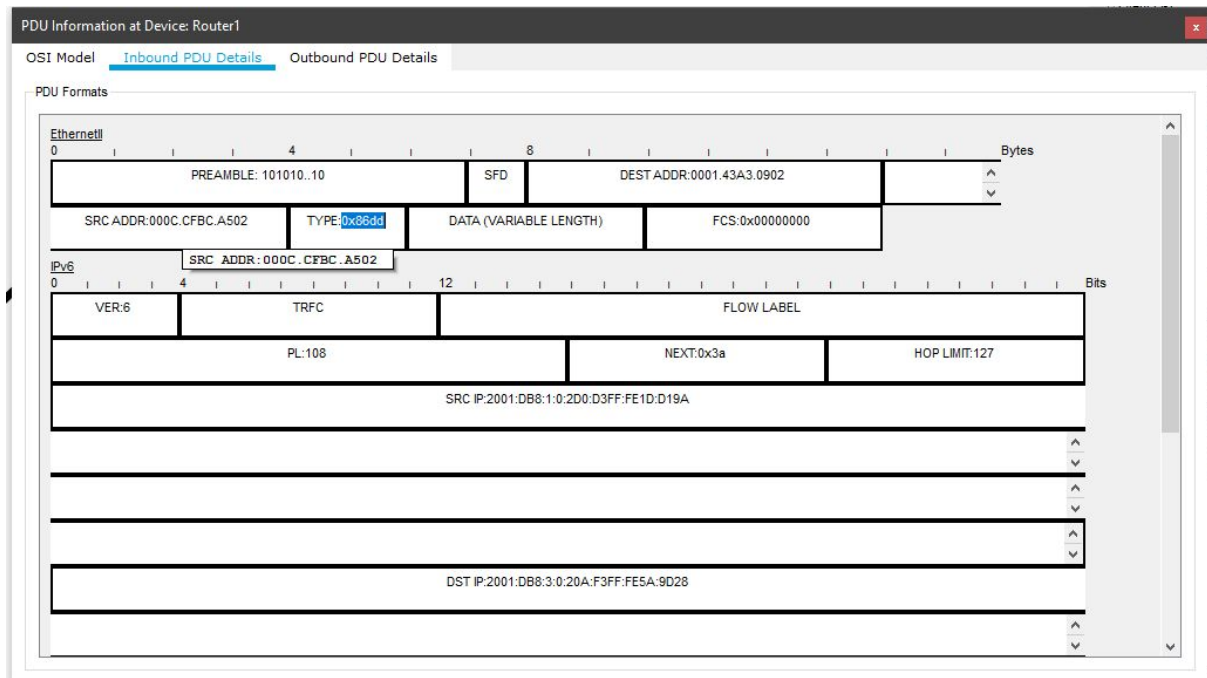
### Ítem c

The network diagram shows a topology with two PCs (PC0 and PC1) and two routers (Router0 and Router1). PC0 is connected to Router0, which is connected to Router1, which is connected to PC1. The routers are labeled with IP addresses 1841. The simulation event log shows the sequence of events for the ping test, including the creation and transmission of ICMP Echo Request messages.

Time(sec)	Last Device	At Device	Type
0.000	—	PC0	ICMPv6
0.002	—	PC0	ICMPv6
0.003	PC0	Router0	ICMPv6
0.004	Router0	Router1	ICMPv6
0.005	Router1	PC1	ICMPv6
0.007	—	PC1	ICMPv6
0.008	PC1	Router1	ICMPv6
0.009	Router1	Router0	ICMPv6
0.010	Router0	PC0	ICMPv6
1.010	—	PC0	ICMPv6
1.011	PC0	Router0	ICMPv6
1.012	Router0	Router1	ICMPv6
1.013	Router1	PC1	ICMPv6
1.014	PC1	Router1	ICMPv6
1.015	Router1	Router0	ICMPv6
1.016	Router0	PC0	ICMPv6
2.016	—	PC0	ICMPv6
2.019	PC0	Router0	ICMPv6
2.020	Router0	Router1	ICMPv6



## Ítem d



Router0 a Router1:

- Mensaje ICMPv6: Tipo 0x86dd
- Dirección Fuente: 0001.43A3.0901
- Dirección Destín: 000A.F35A.9D28
- Dato: -
- 

Router1 a Router0:

- Mensaje ICMPv6: Tipo 0x86dd
- Dirección Fuente: 0001.43A3.0902
- Dirección Destín: 000C.CFBC.A502
- Dato: -

Ítem f

PC0 a PC1:

- Mensaje ICMPv6: Tipo 0x86dd
- Dirección Fuente: 00D0.D31D.D19A
- Dirección Destin: 000C.CFBC.A501
- Dato: -
- 

PC1 a PC0:

- Mensaje ICMPv6: Tipo
- Dirección Fuente: 0001.43A3.0901
- Dirección Destin: 000A.F35A.9D28
- Dato: -